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ABSTRACT

A descriptive model of the Fire Education Resources Information System (FERIS) is examined in this document. Information regarding educational materials relating to fire prevention, protection, and suppression is discussed. A description of the model is presented in two sections. Section 1, Problem Definition, surveys the background and needs for such a system, research methodology, user communities, services and products, objectives and performance criteria, and staffing recommendations. Section 2, System Design, presents the model itself. It contains information on normal system operations, access distribution, search/organization, system interaction flow, input, central file structure, output, media campaign, equipment recommendations, growth of the system, cost estimates, and the FERIS task-planning schedule. A bibliography follows this section. Appendixes include the frequency distribution of survey responses and the comparative analysis of machine-aided indexes, which include examples from the following systems: Library of Congress; "Books in Print"; Educational Resources Information Center (ERIC); Current Index to Journals in Education (CIJE); and the National Information Center for Education Media (NICEM). (CT)

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FIRE EDUCATION RESOURCES INFORMATION SYSTEM FERIS

A Descriptive Model

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PREFACE

This document will propose a descriptive model of a Fire Education Resources Information System (FERIS). Provided adequate funding and appropriate authorization, the Office of the State Fire Marshal may form an operational information system along guidelines established herein. The mission of FERIS is essentially fourfold; all having to do with information regarding educational materials relating to fire prevention, fire protection and fire suppression. (1) FERIS will *search* for existing and available materials. (2) FERIS will *organize* the information about these materials. (3) FERIS will *distribute* the information and (4) it will *provide a mechanism for the acquisition* of same materials by various user groups throughout the State of California. The FERIS model is in keeping with recommendations of the National Fire Prevention and Control Administration (NFPCA), the California Fire Education and Training Master Plan, and the 1976 NFPCA sponsored mini-conference at Asilomar.

The descriptive model is intended to be the central paradigm of the system, out of which can be generated and patterned the actual system. Once fabricated, FERIS will function as an integral component within the overall fire protection and control system. It will operate for an indeterminate period of time.

This document is divided into two sections with appendices. Section I, Problem Definition, will survey the background and needs for such a system, research methodology, user community, services and products, objectives and performance criteria, and staffing recommendations. The second section, System Design, will be the actual model itself.

The narrative prototype will outline three possible phases of system growth, each emerging from a context established by the successful creation of its antecedent. The completion of each phase will constitute an efficient, functioning, entity without disrupting the flow of processes secured in the original state. The first phase will meet all the goals and objectives set out in the Problem Definition. Subsequent phases are concerned with further system development, various upgrades and expansion towards an evolved ideal-state.

It is expressly intended that that this descriptive model will not be *prescriptive* in nature. A more accurate prescriptive model will need to be drawn up by the appointed staff and that will be based upon this document. This descriptive or rhetorical system model will serve as catalyst and initiate a sequence of actions leading to a precise system architecture. The prescriptive design will include time lines and schedules, equipment configuration, catalog and index requirements, formats and the like which can only be constructed upon decisions made by the Office of the State Fire Marshal and the appointed fire-education-intensive staff. Certain operations need to occur prior to the

design of a prescriptive model and those will be outlined herein. This document will get FERIS off the ground but will not fly it. Enough flexibility has been built to this model to allow for a variety of alternative operations and decisions without requiring major changes in the structure of the system as described.

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INTRODUCTION

Given our historical experience with fire, it is not hard to imagine an ideal-state of achievement for modern fire protection and control practices. Our experience has shown that fires will occur of a hazardous nature endangering life and property. Fires occur within cultural and natural ecological boundaries. Fires intrude from one ecology into another. These fires are either planned and controlled or they are unregulated and accidental. The imagined ideal-state, then, would be the elimination of hazardous fire intrusion within and beyond ecological boundaries.

It is improbable that this ideal-state is wholly attainable. Due to the nature of combustion, open fire is inherently unmanageable, *in toto*. However, it is towards this ideal-state that our efforts are directed. By remaining mindful of this goal we can move closer to narrowing the gap between the real and the ideal.

Traditional approaches to fire communication and control can be characterized in terms of *feedback* response. Provided certain actions occur in a sequence, the process is fairly automatic. There is an outbreak of fire; it is somehow detected and it is reported. Information regarding event and locus is fed back to a responsible fire control entity which then responds to contain and extinguish the fire.

Another adaptation to fire is the *feed-forward* process. This is applicable in the case of fire prevention and operates *prior* to an outbreak of fire. Based on our experience with fire, information can be fed forward in anticipation of its eventual outbreak. This information can be communicated to groups or persons who may then more adequately assume responsibility for the avoidance and control of fire. The feed-forward process is essentially educational in nature.

In this way, we have two approaches to fire protection and control. The conventional feedback response coupled with the additional feed-forward process can provide a mutually responsive human adaptation to fire. With both systems fully mobilized we can move closer to our goal.

A few words should be said about the nature of each system and its management.

The feedback response system is preoccupied with fire *control*. It is organized around the internal fire-fighting regiment. Due to its structural segmentation it is easier to manage. In this system, communication is fed back to the fire protection entity; control originates from there.

In the feed-forward process, nearly the reverse is true on all counts. The preoccupation of this system is *education and communication of information*. It is organized around identified groups in the public; it is organized around functionally and structurally differentiated groups; its orientation is external rather than internal. It is the more difficult of the two to manage. Feed-forward processes information and distributes it;

it feeds *information* forward; *communication* originates from a source.

The feedback response is managed on a local basis by individual county and city administrations. Due to the emergency nature of fire and locale, it is obviously best that this be so. However, since the feed-forward process is a less manageable task, it is difficult for the local organization to provide an adequate education or information system. Given the administrative capabilities of a larger, separate entity, it is best that the feed-forward process be coordinated on a statewide basis; its concerns can be statewide as well as local.

The central activity of the feed-forward process is communication of information and education. This process involves the transmission of information. In order to fully facilitate this activity, public fire education needs to be coordinated and organized. A centralized information system provides the basis for and allows for further growth of the feed-forward approach to fire prevention.

Background

Several factors led to the idea of creating a public fire education information system for the State of California. Central among them being the overriding desire to curb avoidable fires and enhance the feed-forward process. The singlemost influencing agents have been the Office of State Fire Marshal and the National Fire Protection and Control Administration. It was in 1976 at the NFPCA mini-conference at Asilomar where discussions began which led to the idea of FERIS. The conference was instrumental in demonstrating the value of exchanging information and experience among those responsible for public fire education. Many communities throughout the nation had already experimented with various pilot programs with an emphasis on information and awareness. These were successful although on a small scale. The idea was certainly not a new one at the Office of State Fire Marshal. The west coast mini-conference served to reinforce the need for a permanently structured and centralized information resource system. Financial assistance was committed by the NFPCA and California was encouraged to develop a model information system. As a result of the mini-conference and widespread interest from other areas, this study was undertaken to assess both the need and feasibility of turning the idea into action and to establish the guidelines along which this action would flow.

In October of 1977, California State University, Chico (CSUC), was charged with this task under the administration and guidance of project director, Dr. Robert G. Main. A financial

grant from the Office of State Fire Marshal was secured to offset expenses. Dr. Main has guided the project in many ways, primarily through the assignment of problem analysis and system design research to students in his CICS 210 course on Specialized Information and Media Centers.

Research Methodology

The research was conducted during the Fall, 1977 semester by both graduate and undergraduate students enrolled in CICS 210 at the Center for Information and Communication Studies (CICS) at CSUC. The results of that research were summarized, expanded and synthesized into this document during the Spring, 1978 semester by Dr. Main and the author.

The research methodology was divided into two tasks: a literature search and data collection from the field. The literature search surveyed a wide range of materials from fire science to systems science. Since an information system of this type was not operational elsewhere, it was necessary to synthesize data from a variety of sources relating to professional fire control practice, on the one hand, and more generalized information systems, on the other. The literature search and the reports generated from it treated both problem analysis and system design components. The literature search explored existing sources of materials, indexes and indexing procedures, as well as estimating the quantity of those materials. As a standard research method the literature search provided useful information to the study.

Data collection from the field involved several processes yielding further information for the analysis/design project. User groups and communities were identified in an iterative process of definition. Potential producers or sources of materials and information were identified similarly. Types, formats and amounts of existing information were examined. A

questionnaire was developed to determine information desired and to provide a further basis for iterations between assumptions, the literature search and field realities. The questionnaire was administered to a random selection of subjects or respondents out of a generalized group of suspected potential users. It was administered by telephone interview and personal contacts. The results of the questionnaire were tabulated and used as part of the basis for the analysis/design problem.

Overall, the research methodology employed standard research tools and methods common to both students and professionals. The information gathered from these processes provided the basis for this document.

SURVEY ANALYSIS

The questionnaire was developed and administered during the Fall Semester 1977. Specifically, the problems addressed by the survey were:

1) To provide empirical evidence to support user community categories.

2) To determine the extent of fire education programs i.e. existing demand or customer potential for fire education materials.

3) To determine parameters of materials being used in terms of audience age, types of program supported, frequency of use, format, and source.

4) To determine equipment available among user groups for use of non-print materials.

5) To determine availability of budgets for procurement of fire educational materials.

6) To identify existing communication patterns for fire education information.

In addition to examining the existing situation regarding fire education programs, materials and information channels, the survey attempted to measure some affective dimensions of the problem in terms of satisfaction and dissatisfaction with present methods of operation, quality and availability of materials. Specifically, the survey addressed:

7) Felt need for additional materials in terms of subjects, and formats and audience targeting.

8) Felt need for a comprehensive information source concerning fire education programs and materials.

9) Willingness to share in-house produced fire education materials.

The questionnaire was designed with 12 questions to collect data that would permit conclusions regarding each problem area. In addition, demographics were recorded of each interviewee's institution or company.

Samples were drawn from the user groups as follows:

Education - 15 shcools selected from the 1977 California Public School Directory. Five each were selected from elementary schools, junior high schools and senior high schools. The sample was further stratified geographically by selection from each Fire Region of the state and by size of community i.e. rural 2,500 population and below, small town 2,501 to 50,000, and metropolitan 50,001 and more in population.

Civic Organizations - 15 non-profit clubs and charitable organizations were selected from the 1976 California Registry of tax-exempt organizations.

Business and Industrial Organizations - 15 organizations were selected as follows: Five each major corporations (over 100 million gross) and insurance companies with California offices were picked from Standard and Poors Register of Corporations. Five industrial associations were selected from the California Directory of Lobbyists and Employers, 1977.

Fire Service Organizations - 35 fire stations were selected from the California Directory of Fire Service Organizations. Five were selected from the California Department of Forestry, 10 from volunteer or partially volunteer departments and the remainder from fully paid professional departments. This sample was also stratified geographically and by size of community similar to the education group.

The survey was conducted by telephone interviews which was a limiting factor in the number of questions that could be asked and in the amount of open ended discussion that could be recorded. A mailed survey would probably have provided more data (and from a wider sample) but was prohibited by the time limitation of the semester close. In any event, 69 usable responses were obtained from the 80 organizations in the sample. Non-response was due to several factors but primarily it was inability to find anyone at the phone number (three of the non-profit organizations); and inability to reach the person with the responsibility to answer the questions (three business/industry and two insurance companies) within the three call-back limitation. Only three direct refusals to participate were received. Two of these were fire service organizations and one was a business firm.

Table 1 provides a breakdown of the sample respondents by user category.

Table 1. Categories of Organizations Surveyed.

Category	Number Responding
Education	15
Civic Groups	12
Business/Industry	6
Insurance Companies	3
Fire Service Organizations	33
Total	69

SUMMARY OF RESEARCH FINDINGS

The results of the survey will be presented as summary data and frequency distributions of responses to each question. Analysis of the data will be within the context of the problem areas specified in the survey design.

Question 1) Do you have any kind of fire safety education program?

Yes: 54
No: 15

The organizations responding that they did not have any fire education program included six fire service organizations, three industry/asscciation organizations, and the three insurance companies. The responses, therefore generally supported the user community designations with one exception. Insurance companies were indicated by this data as being an existing user of fire education materials. This was surprising. An examination of the particular survey forms indicated the person responding from the insurance companies was a member of their public affairs office (this was true of most of the industrial/association sample). It is possible that these people were unaware of fire education programs within or sponsored by the organization. However, this is highly speculative and needs further research to establish validity. It is recommended if future research is conducted, that an attempt be made to contact personnel involved in operations or production within industrial

organizations. A safety or fire safety officer would be the preferred respondent. These responses also indicated the extent of existing fire education programs among the designated user groups. Every school and civic organization had some sort of fire safety educational program as did 85 per cent of the fire service organizations. (Those without programs were primarily volunteer stations).

Question 1a) Who presents your fire safety education?

Firemen:	33
Teachers:	6
Lay members:	9
A staff professional	3
Other	3

As expected, the communities rely primarily on the fire service to present their fire safety education, although significant numbers of organization members also present fire safety education - approximately 40 per cent overall.

Question 1b) Do you ever give programs to other organizations?

Yes; Free: 27 and, Yes - as advertising: 3
No: 15

Question 5b) If materials are produced in-house, would you make them available to others?

Yes: 11
No: 1

Question 5c) At what price?

Free:	1
Nominal Charge:	2

The results of these three questions provide an answer to problem 9 in that they indicate a general willingness to

to share locally produced fire education materials either at no charge or at cost.

Question 2) What kinds of materials do you use?

Materials	24
Slide/type	21
Demonstrations	18
Media advertisements	3
Books	33
Film	27
Filmstrips	9
Exhibits	12
Other printed videotape	15
Overheads	6

Question 3) What kind of material would you like to have available?

Format

Video	3
Film	12
Printed Material	6

Subject

General	6
Training	6
Office fire education	3

Other

More current information	9
No need	6

Question 6) To what age group do you present these materials?

Adult	
K - 6	6
K - 12	15
College age (18-30)	6

Question 7) How often do you use fire education materials?

Weekly	24
Monthly	9
Yearly	3
Irregular basis	9

The finding from these questions established the parameters

for fire education materials currently being used. They indicated the spectrum of format from books and posters to videotapes and multi-media; every age from kindergarten through adult; and a diversity of subject content and frequency of use. No patperns could be identified from these data.

Question 12) What types of audiovisual equipment available for use?

Film projectors	39
Videotape players	42
Slide/tape	42
Overhead projectors	39
None	3

The survey data indicates there is a wide variety of audiovisual equipment available among the user groups. Of particular surprise is the availability of videotape players. This is contrary to every other study consulted and the results (in terms of videotape players) must be viewed with some skepticism until replicatory data is available. Nevertheless, the data shows all types of media formats should be included in the resources inventory.

Question 5) Where do you get the materials that you use?

NFPCA	3
NFPA	15
IFSTA	6
C.D.D.	6
Books	6
Teachers (community college)	3
In-house production	12

These findings clearly indicate the predominate pattern of existing fire education communication channels lies through the fire service organizations and particularly the local fire department for user groups not associated with fire fighting.

Also, the in-house produced materials were all reported by fire service organizations. It is clear, therefore, that to utilize existing behavior patterns, the fire education resources information system must include local fire departments as contact points for the user communities in the information distribution network.

Question 10) Do you have a budget or funds for renting or purchasing fire education materials?

Yes:	30
No:	15
Limited:	6

Of the 30 unqualified affirmative response, six were from educational institutions and 24 from fire service organizations. The findings support the requirement to include materials in the inventory that may be available on purchase or rental basis only.

Question 4) Do you feel there is a good selection of fire safety educational materials?

Yes:	24
Yes, but needs improvement:	3
No:	18

Question 6a) Are materials appropriate for intended age group?

Yes:	39
Could be better tailored to age group:	15

Question 8) If you had other materials, could you use them more often?

Yes:	27
No:	18

The data from the sample gave strong support to the need

for providing more and broader selection of fire education materials and that additional materials would be used. Obviously, the greater usage would provide greater exposure to fire education and more effective teaching of fire education measures because of more effective targeting and subject selection.

Question 9) Do you think there is a need for a central system for information concerning fire education materials that are available?

Yes: 51
No: 12

Surprisingly, three of the no responses were from fire service organizations. The favorable responses come from nearly every user group, across the board. These findings give additional support to the conclusion that a California fire resource information system is needed amongst educators, civic leaders, industry and other potential users.

PROBLEM DEFINITION

We can define our problem as clearly resident within the overall enigma of human adaptation to fire. The process of problem analysis is one of narrowing, defining, and redefining. Of the two communication and control systems available, the feed-back response system will not concern us here. Our problem can first be stated in terms of public fire education; resident in the feed-forward system field.

Each hour in the United States, one person dies, and 25 are injured as a result of fire. It is estimated that each individual can expect to have three serious fires during their lifetime(29). In California alone, there were $208 million in property loss and, more important, nearly 600 deaths caused by fire in 1976(11). It appears that adequate information could have significantly reduced these figures. The National Fire Protection Association has stated the major problem facing fire services in terms of "excessive and unnecessary deaths and human suffering together with heavy economic waste resulting from *avoidable* fires(26)." Avoidance, here, becomes essential to understanding prevention.

An avoidance pattern toward accidental fire is a behavior which is learned, either through experience or education. It can be learned early in life, and continuously shaped and reinforced throughout life by the social process. We should hope

to make every possible effort to minimize experiential learning in this case, except through careful demonstration. Learning avoidance and anticipation of accidental fire involves acquiring the knowledge of how and when fires start; what to do to prevent them; and how to react if a fire does occur. There are many sources for this kind of educational experience, regardless of age. Many programs have been developed throughout the nation and these range from the use of simple posters to the extensive training of elementary school children. It should also be noted that "in communities where people have been educated about fire hazards and emergency procedures, fire losses have decreased dramatically (29)."

But still, fires continue to happen, people continue to die. Some communities in California have excellent year-round programs in fire education; others are limited to the once a year Fire Prevention Week, and still others have little or no fire education. Many respondents to the questionnaire indicated they did not know where to go for information about educational programs. They were not aware of what was available. From this we can further define our problem in terms of a lack of organization in and amongst fire education efforts. There needs to be some way of connecting the communities with the materials and programs. The public fire education information system is one dynamic method of organizing various information sources and connecting them with communities of users.

When asked in the interviews, "Do you feel there is a need for a centralized system for information concering fire education

materials?," the majority of respondents answered yes; many quite emphatically endorsed the idea. It would appear, then, that our problem lies in the creation of a statewide information system. The information system offers the most reasonable solution to the lack of organization in dispersed information about fire education. And, through centralization, it offers even more dynamic capabilities than any single community or group of users could achieve on their own. As a centralized information system its reach could be extended nationwide in accession of information for user communities.

The problem, then, can be narrowed in this way. Within the overall reach for attainment of an ideal-state in fire protection we have two systems available to engage this effort: feedback and feed-forward. The feedback system appears to function normally, outside our present concern; the feed-forward system does not exhibit so concerted an effort. Feed-forward has to do with education and the educational resources are lacking in organization, communication and information. Communities lack awareness as to what is available. A good solution to this problem would be a centralized information system which could search out information and disseminate it, connecting educational resources with user groups throughout the state. This, then, narrows our problem specifically to the creation of such an information system.

We must now address ourselves to sets of subproblems in the establishment of this information system. Who will it serve? Who will contribute? What services will it provide?

What products? Etcetera. All of these, and others, are factors to be considered prior to the development of a model. They are all well within our problem definition process.

USER COMMUNITIES

Potential user groups were identified as early in the research as possible. From these potentials an iterative process began which further narrowed the groups into the five user communities listed and described below. The "user" can be defined as an individual or a group who either has a need for or can benefit from the information made available through the information system.

User Community A: Education

The educational community in California would, by far, be the largest single group served by the information system. There are over 5 million students attending schools in California. The levels of formal education range from pre-school to university. Within this are elementary and secondary schools, high schools, community colleges, state colleges, and universities. The needs of users in education will vary greatly and it is within this field that both contributions to the system and interaction amongst users may be greatest. Nearly all professional fire science curricula is provided by the community colleges and, it would seem, such a public-access and educationally oriented system might serve them in many ways. Since fire prevention education is an ongoing curriculum problem

for schools, the availability and exchange of information between institutions would be helpful. Such an information system and its services should be well received among the educational community.

User Community B: Industry

All branches of business, trade and manufacturing regardless of size comprise the category of industrial users. Their needs not only center around maintaining safe working conditions for their employees and the safety of industrial property and premises; they are also concerned with the protection of their customers. Their needs from FERIS would vary greatly from situation to situation. A grocery store would have different needs than an oil refinery or chemical laboratory. Some industrial users would want information about materials relating to a specific fire problem indigenous to their trade. Others may wish only to promote general fire safety. Certain highly technological fields (e.g. computer users or computer manufacturers) endure extreme fire risks which could be minimized by the availability of resources and information. FERIS could be a factor in the considerations made by industries contemplating location or relocation to California. The ready availability of information regarding industrial fire problems would be encouraging.

User Community C: Civic Organizations

There are many non-profit organizations located throughout the state and in nearly all communities which could benefit from FERIS. Such groups include service clubs, fraternal organizations, state and local agencies and departments, charities, and churches. Examples of these groups would be Kiwanis, Rotary, the Red Cross, B.P.O.E., departments of health and welfare, United Way agencies, hot lines, youth groups, senior citizen groups, Sunday schools and church groups. The members of this user community reach a broad cross-section of society and their influence is great. They are often at a loss regarding fire prevention programs and FERIS would be of great assistance. Civic organizations comprise perhaps as large a group as education or industry. Demands placed on the information system may not be as great from this community, however, due to the variability of interests among them and time factors. Even through they do not represent the pressing needs for fire education as some other groups, FERIS should be made available to them, if for no other reasons than that they represent the most heterogeneous sample of society and would tend to reach areas otherwise untouched by fire education efforts.

User Community D: Insurance Agencies

Insurance agencies comprise a small group, although widely dispersed throughout the state. Their agents are likely to be represented in every community in the state. Nearly all home, industry and property owners have fire insurance which protects

them against losses from accidental fire, water damage incurred in fire containment, fires resulting from natural disasters and from weather. It is in the best interest of both consumers and insurance companies to minimize the occurrence of hazardous fire. The insurance agencies have many preventative type programs in effect at the present and are always searching for more materials. The programs they coordinate are presented to agents, policy-holders and the media. The user community of insurance agencies would contribute as well as withdraw information from FERIS.

User Community E: Fire Services

The users in this community comprise all members of fire fighting organizations. There are several types including city and county fire departments, industrial fire departments, military fire-fighting units, independent fire departments (such as those on the University of California campuses) and volunteer fire departments. FERIS should make a special effort to reach volunteer fire departments in rural areas because these groups are perhaps the most isolated from fire education programs. Also included in this group would be fraternal organizations of retired fire chiefs and fire fighters as well as auxiliary groups directly associated with fire services. Cooperative use of the information system should be encouraged among the State Department of Forestry and the U.S. Forest Service. Military bases in California all have specialized fire fighting depart-

ments and have mutual aid agreements with non-military fire departments in surrounding communities. Information made available through FERIS could be accessed by these fire services also. Industrial fire services could make use of FERIS as well.

User Communities and Right of Access

When considering the variety of persons and groups, varying both in geography and demography, it should be kept in mind that every effort to get the right information to the right group should be made. The appropriateness of resources will have to be closely matched with the specified user community. Cooperation, exchange of resources and information, and contributions of information to the system should be encouraged as well as evaluations of materials by the user groups.

It should be noted that the information system will be a public-access system. In no way shall any individual or group be denied use of the system for any reason. If a particular individual or group does not fall into one of the above categories they should not be discouraged from using FERIS.

(This "right of access" may be modified if and when the system comes to include actual resources beyond information about them. Discretion will become necessary when handling and care of materials is considered.)

FERIS DESIGN REQUIREMENTS

So far we have defined our problem in terms of the overall enigma of fire, the two approaches to communication and control of fire and reduced these to the creation of the information system, FERIS. We have defined the user communities with which FERIS will interact. Now, we must outline the services, products, index, staff and auxilliary support requirements necessary to design the information system. Our problem orientation must shift from fire, specifically, to the information system and its operation.

Two things dominate our considerations here. One is the general complexity of the tasks involved in information processing. The other concern is that the system be simple and clear enough for the user groups and individuals to interact with. The information obtained by the system must be organized in ways both efficient and understandable by an essentially mass audience. Although the communities of users are well defined and categorized, the services and products must conform to single formats and operations which will treat all concerned. Existing behavior patterns have been surveyed and the simplicity of interaction with FERIS is dependent on them. Deviations from existing communication patterns, duplication of existing systems, "red-tape" or confusion of interaction between the public and FERIS must be minimal. The occurrence of any of these factors will

serve to diminish the overall effect of FERIS. Recent criticisms of government have been directed not only at its costliness but also the difficulty and complexity with which one is forced to deal when interacting with bureacracy. Solutions formed within the governmental structure to cope with this problem include the publication the *Compleate California Consumer Catalog* by the Department of Consumer Affairs and the food-stamp outreach programs. FERIS must strive for a similar simplicity and clarity so that it may be well utilized and fulfill its promise in reducing overall fire hazards.

The general complexity of the tasks of information organization will be explored in the index requirements section and the appendices. We must now turn to the services which will be made available to the public by FERIS. This, as well as the products available, the products produced, staff and auxilliary support requirements, will be discussed in the following pages.

Services

The services FERIS will provide constitute the area of most interaction between the information system and the public. As outlined in the Preface, the activities FERIS will be involved in include search, organization, distribution and acquisition. The service area is concerned with the distribution and acquisition activities, primarily, although there are points at which services will touch each one. The research indicates the services deemed necessary are three in number: 1) provide toll-free ("800"number) telephone interactions, 2) arrange for the availability

of FERIS products and 3) provide mechanisms for the acquisition of resources.

The toll-free telephone interactions will serve the purpose of allowing users unable to obtain FERIS materials to interact with the system. It will also serve as the first order response to inquiries placed through the "800" telephone number. Dialing a phone is perhaps one of the simplest and most convenient operations conducted in ordinary life. It is quite probable a person's first interaction with FERIS may be through this toll-free service. The phone interaction will also provide the basis for retrospective searches in existing catalogs or FERIS products the specific user may not be able to obtain. Phone interactions may be as simple as referral to fire stations or the nearest location of materials. Or, they may become as involved as helping order materials, establishing the category of user or obtaining information via user feedback as to the success of the system. The toll-free telephone interaction service may prove to be one of the most valuable in addition to the actual catalog and index produced.

FERIS must also serve to make its products and materials available to the public. Such products as catalog and index, order forms and newsletters should be available in every community. The most likely place for this is the local fire stations. The survey of users indicated the existing pattern of behavior for most persons in seeking fire education information was to go to the fire station or call to obtain information about fire prevention. In addition to this, fire stations

often serve other information functions such as county tourist information centers, voter registration places, national park information centers, and the like. It would seem the most natural of places for the FERIS user interface. The disadvantage is that it will require the cooperation of local, city and county fire departments, as well as California Department of Forestry and U.S. Forestry Service stations (if possible). Every effort must be made to engage the local fire department with FERIS. Where this is not possible or feasible, the alternative will be the toll-free telephone number. FERIS must provide the service of making its products available, one way or the other. These were the topmost considerations in the research. Other methods might include selling the catalog and index at cost, placing them in libraries or in other state agency offices. The fire station would seem the most appropriate among the options considered primarily because of the over-riding factor of existing behavior patterns.

Obtaining the educational resources once information about them is obtained is often a difficult and time-consuming task. Estimates from producers range from two to eight weeks to actually receive materials. FERIS should provide its users with a mechanism for the acquisition of materials referenced in the catalog. This may happen in one of two ways. The person may be provided with enough information and forms to order the materials directly or FERIS will arrange for acquisition of resources internally. In this way, there may be communication between the user and producer or there will be communication

between the user and FERIS with FERIS communicating with the producer. Of the two, the user/FERIS method of acquisition would apparently take the most time, whereas the user/producer method will take less time. More errors or misunderstandings may occur as a result of user/producer communication; less confusion will result from user/FERIS acquisitions. Both means of obtaining resources have their pros and cons. It is suggested that both be made available to the public, with each attempt at acquisition treated on a case-by-case basis depending on the situation.

Products

When considering the requirements for products we must look at what is available as an educational resource, as well as the end products produced by FERIS. The available resources will fall into one of the following categories:

1. Book/booklet
2. Pamphlet/flyer
3. Poster
4. Film 16mm
5. Filmstrip
6. Slide
7. Slide-tape
8. Video tape recording
9. Demonstration/exhibit
10. Transparency
11. Audio recording
12. Teaching aid
13. Lesson guide
14. Speaker
15. Consultant

These are the types of media about fire prevention which will become available through FERIS. Each single resource will be catalogued under one of these formats.

The products produced by FERIS are, essentially, three: 1) the catalog and index, 2) the forms or paperwork necessary to make use of the system and 3) a current awareness bulletin(31) or newsletter.

The catalog and index will be the primary products of FERIS. They will constitute one book-like document, which is easy to use and uncomplicated to reference. Each entry should include an abstract describing the resource. Prices of materials will also be included as well as title, producer, type of resource and the usual bibliographic information. This catalog is the central product of FERIS; the most useful evidence of just what FERIS is all about.

Although paperwork must be kept to a minimum, a form (or forms) will have to be filled out, if a user wishes to obtain a resource through FERIS. These forms do not need to be produced by the staff of FERIS but can be arranged for by the staff. They should set the parameters and limitations necessary to have the forms produced. It should be kept in mind that the forms should be as simple to use as possible.

A quarterly or possibly monthly newsletter should also be provided by the FERIS staff. This would serve to inform users on a mailing list of special FERIS information and services. It could present evaluations of certain materials or of the system itself. The newsletter could look into the amount of time some producers take to deliver materials. There are many uses for such a publication, most of which could be left to the discretion of an editor in the State Fire Marshal's office public affairs department. The newsletter need not be produced or written by the FERIS staff although they should monitor its information content and consult with the public affairs people. It is a product of FERIS because it is about and for FERIS.

These are the minimum products for the start-up and first phase of operations. If and when expansion of the system is made, other products may be included. These might range from actual resources themselves such as films or tapes, to accession lists, further bibliographies, directories and periodicals.

Catalog and Index Requirements

The organization of resources into a central bibliographic catalog and index will be the most difficult and complex of tasks FERIS must deal with. Considerations as to format and search complexity are taken up in the appendices authored and arranged by Jerry Callaghan. This will also be approached more thoroughly in the system design part of this document. Here, we are interested in the topics to be covered by the index and catalog as well as its breakdown according to user communities.

With the community of users varying in levels of sophistication, pertaining to fire prevention, FERIS proposes to cover the following topics, they are:

GENERAL SAFETY
a. Products
b. Automobiles
c. Farm equipment

FIRE SAFETY
a. Fire prevention
b. Hazard identification
c. Burn Prevention
d. Codes and standards

FIRE CONTROL
a. Individual (fire extinguish)
b. Professional (fire depts.)

FIRE REACTIONS
a. Smoke detectors
b. Escape plans
c. Fire Dept. notification
d. Smoke
e. First aid

INSTITUTIONAL SAFETY
a. Hospitals
b. Nursing Homes
c. Schools
d. Federal Buildings

OCCUPATIONAL SAFETY
a. Industrial
b. Agricultural
c. Retail/Commercial

HOME FIRE SAFETY
a. Kitchen
b. Laundry room
c. Livingroom
d. Basement
e. Garage
f. Storage areas
g. Yard and grounds
f. Bedroom

RECREATIONAL/ OUTDOOR SAFETY
a. Forest/camping
b. Barbecues
c. Lighter fluids
d. Spark arrester/ motor bikes

FIRE HAZARD/ INFORMATION
a. Flammable liquids
b. Flammable fabrics
c. Electricity
d. Wiring
e. Fuses
f. Lights

MISCELLANEOUS
a. Explosive/ mixtures
b. Heating systems
c. Furnaces
d. Space heaters
e. Fireplaces
f. Wood stoves
g. Appliances
h. Kitchen range
i. Smoking materials
j. Matches/lighters
k. Cigarettes/cigars
l. Television sets
m. Hair drying applicances

In addition to these topics, each user community should be treated separately in the index. A user from education should be able to look up resources in an education-specific part of the index. The same applies to industry, fire insurance agencies, civic organizations and fire services. Special considerations should be made for the eductional community where resources can also be broken down into age-grade group classifications.

Bibliographic information should include: type of resource, author/producer, cost, estimated time for delivery, date of creation, number of pages (for a book), running time (for a film or slide presentation), as well as a succinct abstract providing a brief qualitative analysis of the resource. This is not an

inclusive list of bibliographic requirements. Adjustments to this will have to be made by the fire-education-intensive staff, which is our next consideration.

Staff Requirements

The staff requirements are essential to the creation of FERIS. The research, as well as consultation with Dr. Main, who has much experience in this area, has uncovered the following types of persons and their qualifications. Their employment will be necessary to make FERIS operational. The number of specific staff will be four. They will include 1) a management information systems specialist, 2) a programmer/analyst, 3) a fire education specialist, and 4) a clerk/typist. Descriptions of each and their functions will follow.

1) Management Information Systems(MIS) Specialist

The MIS specialist will be the manager of the FERIS group. He or she will be responsible for coordinating the activities of FERIS and assuring that they run smoothly. This person will have active responsibilities as well as administrative ones. She or he will be involved in the prescriptive design of FERIS, will work with the programmer/analyst in devising data formats and computer programs for the system, as well as overseeing and assigning the tasks of the other members of the group. The MIS specialist will be the spokesman for the group and will coordinate interactions between it and the Office of State Fire Marshal, the auxilliary support, and the public. He or she would

do a minimum of consulting with special interest groups among the user communities. The major portion of the MIS person's responsibilities and duties would be directed towards the design, functions, evaluations and control of the FERIS group and information system.

The MIS specialist should be experienced with information systems and networks, electronic data processing, and management science.

2) Programmer/Analyst

The programmer/analyst will be responsible for the design of electronic data processing elements involved in the make-up of FERIS and for machine transformation of records in existing data bases. This person will have to design the bibliographic data system or search and modify an existing system to the needs of FERIS. This will involve computer systems analysis as well as computer programming. The programmer/analyst should be experienced in working with information systems, library science programming and bibliographic data processing.

3) Fire Education Specialist

The fire education specialist will oversee content of the information system as well as do limited consulting. He or she will be responsible for the qualitative requirements of the system and will be the authority as to placement of resources into the system. The person will be a specialist in fire

education materials as well as library and information science. This position will be concerned with nearly all the fire-specific, fire-education-intensive aspects of the FERIS system. Where the other two members are form and format specialists, this member will be content oriented.

4) Clerk/Typist

This member of the FERIS group will be responsible for all the clerical functions necessary to make the information system operational. This will include typing reports, filing, taking notes and dictation as well as other ordinary clerical tasks. There will be some machine operation involved as well as terminal data entry. After FERIS is up and running, this person may become responsible for the toll-free telephone interactions with FERIS. The clerk/typist should have experience with MIS, keypunch, terminal data entry, as well as word processing and other normal functions of clerical types.

This concludes the staff requirements. More accurate job descriptions will have to be written by the Office of State Fire Marshal based on State of California hiring procedures. Salaries should be commensurate with experience; worst case estimates are detailed elsewhere in the document. Due to the high specificity of each position, a thorough search for qualified applicants will have to be made; the right person for the right job is essential to the operation of FERIS.

Auxilliary Support

The auxilliary support of FERIS come in two forms by way of two external groups; one of which is already functioning, the other will have to be constructed. The purpose of auxilliary support is to take charge of those tasks which need not be included in the efforts of the FERIS group itself. These tasks are either too small to be included in the FERIS group activities or too large and beyond the scope of the four persons directly associated with FERIS. These auxilliary support tasks will be taken up by the Office of State Fire Marshal and a FERIS Advisory Board.

The advisory board will have to be instituted by the Office of State Fire Marshal. It will consist of two ex-officio members: the State Fire Marshal and the Director of FERIS(MIS specialist). Members from other sectors will include: the fire education specialist, the President of the Fire Chiefs Association (for California), a representative from the California Department of Forestry, a representative from the U.S. Forest Service, someone from the State Department of Education specifically interested in fire education, a labor representative from the firemen's union or labor organization, as well as a representative from user communities B, C and D. The functions of the advisory board will be to develop policy, review programs, make budget recommendations, interact with the legislature regarding FERIS, evaluate the system in general and make whatever ethical judgements which may arise.

The other form of auxilliary support will come from the Office of State Fire Marshal. This office will be responsible for the newsletter of FERIS, publicity and media support, budget preparation and presentation, securing of office space and maintenance of FERIS working areas. They will also be responsible for dealing with interactions outside the scope of FERIS. Both forms of auxilliary support will serve to administer interactions which might otherwise interfere with the efforts of the internal FERIS group.

Functions & Objectives of FERIS

We have now summarized and synthesized the major portions of the research, described user communities and outlined the various design requirements necessary to complete our problem analysis. We are now in a position of firmly stating the functions and and objectives of the centralized Fire Education Resources Information System (FERIS) we wish to create. These functions and objectives will be stated in list form. There is no priority arrangement involved; all are equally important. They are intimately tied to the following section on System Design.

Functions

1) FERIS will *search* for existing and available fire education resources.
2) FERIS will *organize* the information about the materials and resources.
3) FERIS will *distribute* the information throughout the State of California to various individuals and user communities.
4) FERIS will *provide a mechanism for the acquisition* of these materials by the individuals and groups it serves.

Objectives

1) to develop a centralized information system.
2) to provide a common directory and index of existing materials and information
3) to not duplicate existing systems or services.
4) to use established patterns and procedures aimed at simplified interaction with the system.
5) to coordinate a cooperative approach to increase the size and volume of resources and citations.
6) to create an advisory board whose purpose will be to alert FERIS to the various components of its community of users, evaluate the programs of the system, provide an internal political mechanism for gaining budgetary support and to help delineate the scope of operations.

SYSTEM DESIGN

With the requirements, functions and objectives of FERIS clearly defined, we are now in a position to look over the actual design of the system. The system design will survey the normal operations of the information system, the interaction flow, media coordination, and start-up procedures. All of these pertain specifically to Phase I operations. Two other possible strages of growth, Phase II and Phase III, will be discussed briefly at the end of this section. What is described here will essentially fulfill the need for an information system as posed in the Problem Analysis. The implementation of the information system may be patterned after this descriptive model of the system design.

NORMAL SYSTEM OPERATIONS

The normal system operations, on a day to day basis, will include actions taken by the user group(or simply, user), the fire station and FERIS central. FERIS central is the main office used by the system organization and is intended to be the center of operations, from which will originate all system communications and responses to field inquiries. The system will operate from this centralized base with the cooperating fire stations acting as the primary points of interaction. In

this way, the system may be viewed in terms of a network(see fig. 1).

The normal system operations can be divided into two areas of activity, those of access and distribution, and those of search and organization. Access and distribution operations are likely to originate from the field, moving from the user towards FERIS central, and will be described this way. Search and organization actions will probably be initiated by FERIS central and move outwards through the network. What follows is a description of how the system should operate when it becomes fully functional. The actions involved in getting the system to the operational stage will be described later in the System Design section.

Access/Distribution

The operations/activities involved in the access and distribution of the system information, identified by level in terms of user groups, fire station, and FERIS central are listed below.

User group:

The user is likely to make contact with FERIS in one of two ways, perhaps both. A representative of the community will gain access to the information system by either a) contacting the local fire station(by phone or in person), or b) directly contacting FERIS via the toll-free "800" telephone link. The user will either request or inquire about information and

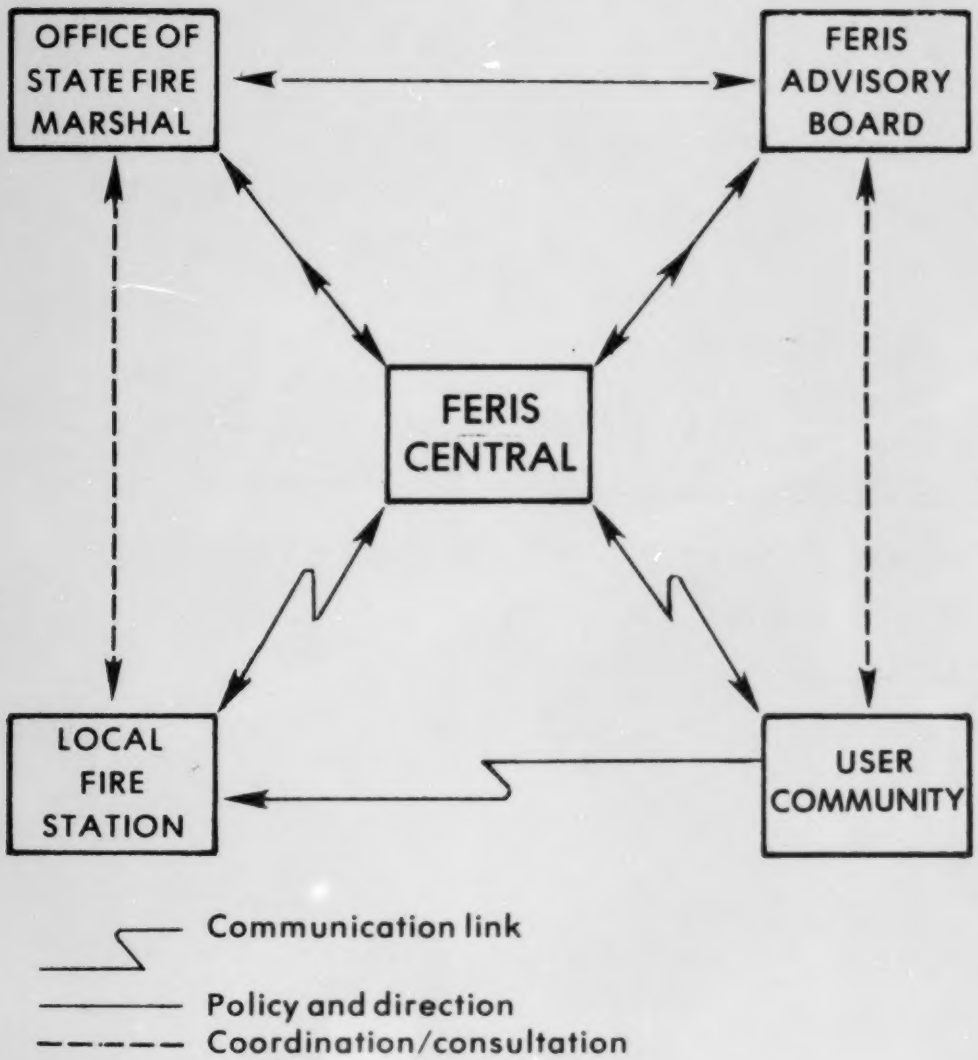


Figure 1. FERIS Operations Network

educational resources. He/she will probably be interested in obtaining materials discovered through the information system.

Fire Station:

The fire station responds to the request/inquiry in a number of ways. It may a) fill the request from local resources, b) search the catalog and index for an appropriate resource, c) furnish information on how to order the materials needed, or d) refer the user to FERIS central by providing a catalog request form or simply supplying the "800" phone number. Any or all of these operations may be conducted in a number of combinations.

FERIS central:

The tasks and operations assigned to the central office are, by nature, more complex than those in the field. FERIS central assumes the major burden of operations related to access and distribution. FERIS central will:

a) Collect, index and catalog a central inventory of fire education resource information.

b) Produce an annual catalog with index and distribute these to each cooperative fire station(forms provisions is also included as part of this task).

c) Respond to individual request/inquiries from fire stations or users and either 1) conduct a retrospective search of catalogs, indexed and data base, or 2) furnish information on how to order the materials needed, or both.

d) Perform special evaluation tasks, provide management information, and other special functions as required.

e) Provide a formal fire education resources communication channel to users and fire stations(via current awareness newsletter).

Access and distribution operations of the system will ordinarily function on a day-to-day, monthly and/or yearly basis. These are ongoing operations and will constitute normal system operations.

Search/Organization

The search for new materials and the organization of data in systems files will involve the following operations/activities at each level.

FERIS Central:

Search and organization activities are centered around the actual fire education resources themselves. Data collection will be another ongoing activity of FERIS central. FERIS will have to search for these resources as well as organize them, as stated earlier in the analysis. As regards the functions, FERIS will:

a) Conduct a continuing active search of literature, data bases, catalogs, etc.

b) Establish and maintain communications with principal production houses. The initial data base formation is likely to identify and yield information about the major fire education resource producers.

c) Abstract, index and enter document records into exist-

ing data files.

Fire Stations:

The fire stations will contribute to the search and organization operations in three ways. They will a) report existing local materials for inclusion in the initial data base, b) report new materials produced or discovered to FERIS central, and c) report evaluation data as it becomes available.

User groups:

The user groups may report materials they wish to have cataloged in FERIS. These may be resources they are already using which are not readily available through another source or new resources they either produce or discover. The search and organization functions of the user groups will be, then, a) report materials produced or discovered to the local fire station or FERIS central, and b) report use and evaluation information to the fire station or FERIS central. This last, is totally optional and not to be construed as a prerequisite for use of the system. Evaluation forms will be made available and their use encouraged but not demanded.

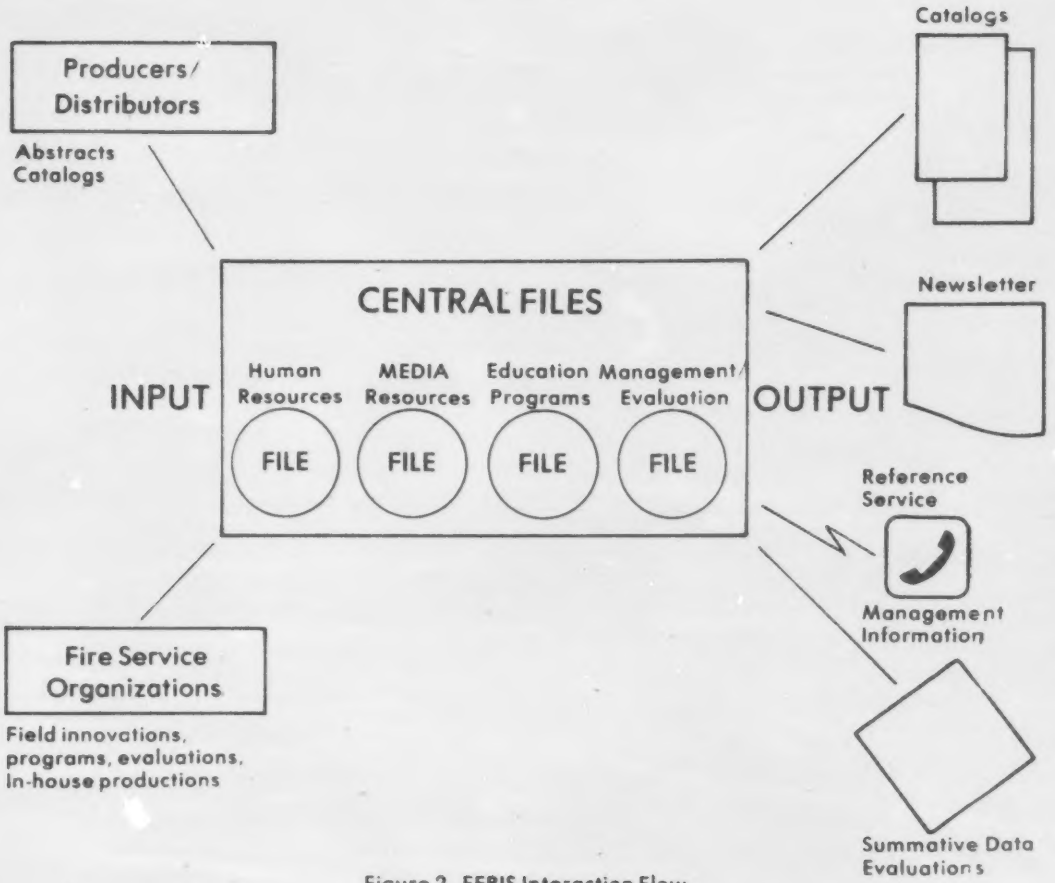


Figure 2. FERIS Interaction Flow

SYSTEM INTERACTION FLOW

Information is a commodity. The information system conducts this commodity through it; processing it and transforming it. The system interaction flow describes the way in which information is to flow through the system and what happens to it along the way. This model is essentially a "black box" model with the familiar input, throughput and output operations. These operations and the interactions between them are depicted graphically in Figure 2. The focus here is information as a commodity flowing through FERIS, entering in one form and exiting in another. We are especially concerned with the central file structure of the information system, its organization and processes. In this model the inputs are equivalent to that information coming into the system; the black box is FERIS central, and the output is the transformed and organized information. The central files are resident in FERIS central and are the storage/retrieval media; their organization is the first step in throughput operations. Fitting the inflow of information to the organization of the central file structure will, in effect, constitute the operations necessary for the transformation of information which will become the outflow pattern. This description is not intended to be complete or thorough. The appointed staff will need to explore this aspect of the model in depth, in the course of designing the prescriptive model. This will

give the basic flow and interaction patterns which will need to be more clearly differentiated and specified during implementation of the system.

The system interaction flow will be described in terms of a) input, b) central file structure and c) output.

Input

The inputs will arrive in a random or semi-organized manner. They will vary in form and will originate from essentially two sources. The input constitutes all the information about fire education materials to be located and obtained by FERIS. The sources for these will be either 1) the producers/distributers(as cataloged in a number of data bases) or 2) materials produced in the user communities and held in specific localities statewide. The difference between the two is that Source 1 information will arise from the active search and inquiries of FERIS through existing data bases; Source 2 information is likely to arise from the immediate service field of FERIS and will not normally be organized into an existing data structure. The first interactions in the flow will occur at the interface where FERIS cental receives the information from Sources 1 and 2.

Central File Structure

The central file structure is extremely important to the operations of FERIS. After receiving the inputs into the system it is necessary to organize them into the basic storage files,

from which they will later be retrieved. The data elements which are placed into the system will determine much of their output form and their order and definition constitutes the central file structure. Within this structure the information may be further organized for the purposes of processing, cross-referencing, and retrieval of specific data. The second interaction involved in the flow of information after receipt of inputs will be to identify it according to the central file inventory.

The central files inventory is broken down into four specific files. These are 1) human resources(e.g. speakers, consultants), 2) media resources (e.g. books, pamphlets, films; individual items), 3) educational program resources(e.g. entire fire prevention programs, kits, packages; multiple items combined into a unit) and 4) management information(e.g. research and development, evaluations of resources, usage data).

These files will be further indexed (and cross-indexed) according to subject matter and type as listed in the product, catalog and index requirements. Further cross-referencing within the central file structure should be worked out both geographically and demographically using data obtained from California Fire Incident Reporting System(CFIRS). In this way, the occurrence of mismatched resources with specific user communities can be prevented. It is not helpful to give out information on rural fire education resources to users living in downtown Los Angeles or reference a resource on restaurant fires for a group of apartment owners. Further and necessary file differentiation within

the four files of the central file structure will guarantee both the accessibility of the information as well as the appropriate retrieval of specific data. It is assumed that these files will be maintained, stored, processed and retrieved from an on-line computer. Much of the central file structure, its processing, cross-referencing and data extraction capabilities will be dependent on the resident software package either purchased or developed by the FERIS staff. Examples of existing central inventory and indexing schemes for similar types of information resources data bases are provided in appendix B.

The interactions involved with the central file structure involve indentifying the resource according to the four files and their internal differentiation, as well as entering them into the system via terminal. The next set of interactions involves retrieving the information in its output form.

Output

The output will be the organized form in which the information is retrieved from the system and released to the public (with the exception of management information to be used internally). The interactions here have to do with the distribution of information processed by FERIS. This will emerge through a number of operations not included her but which must be enumerated in great detail before the system can become opertional. The output will occur in four forms, these being

1) refernce service (e.g. toll-free interactions with users, fire station), 2) the catalogs and indexes produced and distributed to fire stations, 3) the newsletter to users and fire stations and 4) management information distributed internally (e.g. summative data, evaluation). These interactions occur along the interface where FERIS releases the processed and organized information to the specified users.

We have now surveyed the system interaction flow from input to output, beginning to end. This is a continuing process and one in which FERIS will be involved daily. The most important aspect of it is what occurs in the black box: FERIS central. Specail attention will have to be given this aspect of the entire information system when the staff details its operational prescriptions.

MEDIA CAMPAIGN

If FERIS is to be an effective method of enhancing fire communication and control efforts, its existence must be made known to the public. The ordinary channels of communication are the media; including television, radio, newspapers and magazines. A concerted effort should be made to make the public aware of FERIS, what it does and how to interact with it. It is suggested that a media campaign be coordinated from the public affairs office of the Office of State Fire Marshal.

Two factors must be considered in preparing this media campaign. The effect of FERIS, overall, is dependent on these two factors.

1) The user community must be aware of the *need* for fire education information and the *availability* of fire education resources, and 2) the local fire service organizations must cooperate fully as the local contact on providing fire education resources information.

The media campaign is essential to achieving both of these goals and they should be considered paramount in the media plan. Ease of access and the importance of fire education should be stressed throughout the media campaign. A key to the usefulness of FERIS is that it does not require a drastic change in communication patterns by the user community. These groups look to their local fire service organizations to support their fire

education programs. FERIS assists the local fire service personnel in the quality and quantity of fire education resource information they can provide their communities.

The media campaign should make use of the public service announcement (PSA) function of television and radio. The public affairs office should strive to place its 30 to 60 seconds spots, as close to prime time viewing as possible during the first several weeks of FERIS' initial operations. Magazine and newspaper announcements should be placed prominently, as well. FERIS is a public service and it should be made known through the standard PSA function.

Another consideration should be given to the name, "FERIS" and the establishment of a common logo to render its identity as immediately recognizable as possible. The logo should be universally placed throughout the state, as well as in all of FERIS' visual communications. A window sticker or sign could be made using this common logo and placed in all cooperating fire stations. This way, FERIS would be known and recognized; a person would know whether FERIS was available through their local fire station or not. If not, they could use the toll-free number. A common graphic mark or symbol identifying FERIS should be effective.

A typical PSA for FERIS would contain the following messages: 1) that FERIS exists, 2) that individuals are responsible for the prevention of fire, 3) FERIS makes information available to increase personal awareness of fire hazards, 4) a person or group may use FERIS by either a) contacting their local

fire station or b) using the toll-free number (supplied prominently in visual media; repeated twice or more in aural media), and 5) a reassertion of FERIS' existence (aural media) or the prominent display of the FERIS logo/symbol.

EQUIPMENT RECOMMENDATIONS

The computer equipment required by FERIS will either be purchased out right or shared from existing resources available through the Office of State Fire Marshal. The equipment involved with the information system will be text and bibliographic oriented. Bibliographic data ordinarily requires large amounts of storage capability, as well as thoroughgoing sort and search programs which also require a large amount of computer space. The equipment needed by FERIS will include: a disc drive/storage component, a tape read/write unit, a video-display terminal, a printer and a processor. Since much of the data will arrive on magnetic tapes, the tape unit is very important. The other components are standard computing requirements. The disc component should be capable of handling up to 100K of bit storage and the processor component should be capable of handling programs and data to this amount also. A stand-alone time-shared computer is recommended for purchase by FERIS(including the peripherals). If it can be so arranged, use of existing equipment might be less expensive, but this will have to be a timesharing type with data entry available through a terminal. Batch processing is not recommended considering the data type and functions of FERIS as an information system.

GROWTH OF THE SYSTEM

Phase I

Phase I growth of the system will begin at the O-point on the planning schedule after enabling legislation and funding has been accomplished. It will include start-up procedures time and one year's full operation and experience. At the completion of Phase I, all the recommendations, prescriptions and design requirements as put forth in this document should be achieved. FERIS will, at this time, be a fully operational information system interacting with its user communities and producer/distributers of fire education resources. At the end of one year's operation after start-up, management data will be reviewed, evaluated and decisions made to proceed to Phase II.

Phase II

Phase I growth constitutes real projections and actual expectations. Phases II and III represent speculative growth of the system toward a more comprehensive information system the scope of which may transcend educational materials. Phase II is a median stage in this growth, being an expansion of the educational functions of FERIS and also laying the groundwork for Phase III.

Phase II growth of the system would involve primarily the establishment of a centralized fire education resources library where actual resources would be held and maintained, loaned to users and acquired for the use of user communities. Production facilities for the manufacture of in-house education programs or resources might also be established at this point for use by the state and other cooperating entities. Resources, in Phase II, would still be limited to an educational emphasis. The main efforts here may be directed toward acquisition of valuable resources, equipment with which to use these resources and the production facilities necessary to generate fire safety materials. A secondary growth during this phase may be to duplicate this library in a number of regional locations throughout the state. This would be costly growth but might be necessitated based on experience acquired in Phase I. That is, if FERIS proves to significantly reduce the occurrence of hazardous fires over a period of time, as is indicated in the research, then growth to the regional-library stage may be indicated. Production facilities would remain centralized.

Phase III

Phase III growth would allow for the expansion beyond educational materials relating to fire prevention to the inclusion of materials related to any aspect of fire protection and control. This would serve a much larger group of user communities as well as serving each one to a more intensive degree. This

would provide people with information about the latest advances in fire technology, a number of special individuals with skills for fighting specific kinds of fires, and numerous other resources. Expansion beyond educational resource information would probably serve the fire service area more directly and appropriately than Phase I or II would. It would serve to keep everyone concerned with fire problems up to date on the latest fire protection and control information.

Consideration should be given at this stage to participation of the California FERIS data base with other public and private related data bases through a distributed data base communication network. The system could provide expanded geographical access as well as an expanded range of services. For example, user communities could be furnished access to information data bases concerning safety, industrial safety, recreational safety materials as well as fire prevention. This is cited only as an example. The possibilities of information access and exchange are difficult to measure for the future with the rapid increase in computer and communication capabilities and the corresponding increase in information collection and storage applications.

COST ESTIMATES

(Note: These are worst-case estimates based on the descriptions in this document and discussions between the director, writer, and index researcher. These may be modified and adjusted when the budget is delineated by the FERIS staff.)

START-UP COSTS

Estimated cost of capturing existing data = $22 to $30 per record

Estimated initial document number = 2,500 x $22 = $55,000

x $30 = 75,000

Initial data capture TOTAL estimated cost = $55,000 to $75,000

Estimated cost of stand-alone computer system = $60,000

(This cost may vary considerably depending on detailed requirements. Use of existing computer facilities on time-share basis may reduce costs)

Estimated cost of programming development = $55,000 to $60,000

Equipment & programming TOTAL estimated cost = $115,000 to 120,000

Estimated cost of media publicity campaign = $50,000

Estimated cost of travel incurred in start-up = $15,000

Estimated cost of publications = $10,000 to $15,000

Estimated start up costs GRAND TOTAL = Between $245,000 to $275,000

ANNUAL OPERATING COSTS

Salaries & Benefits (4 persons) = $100,000

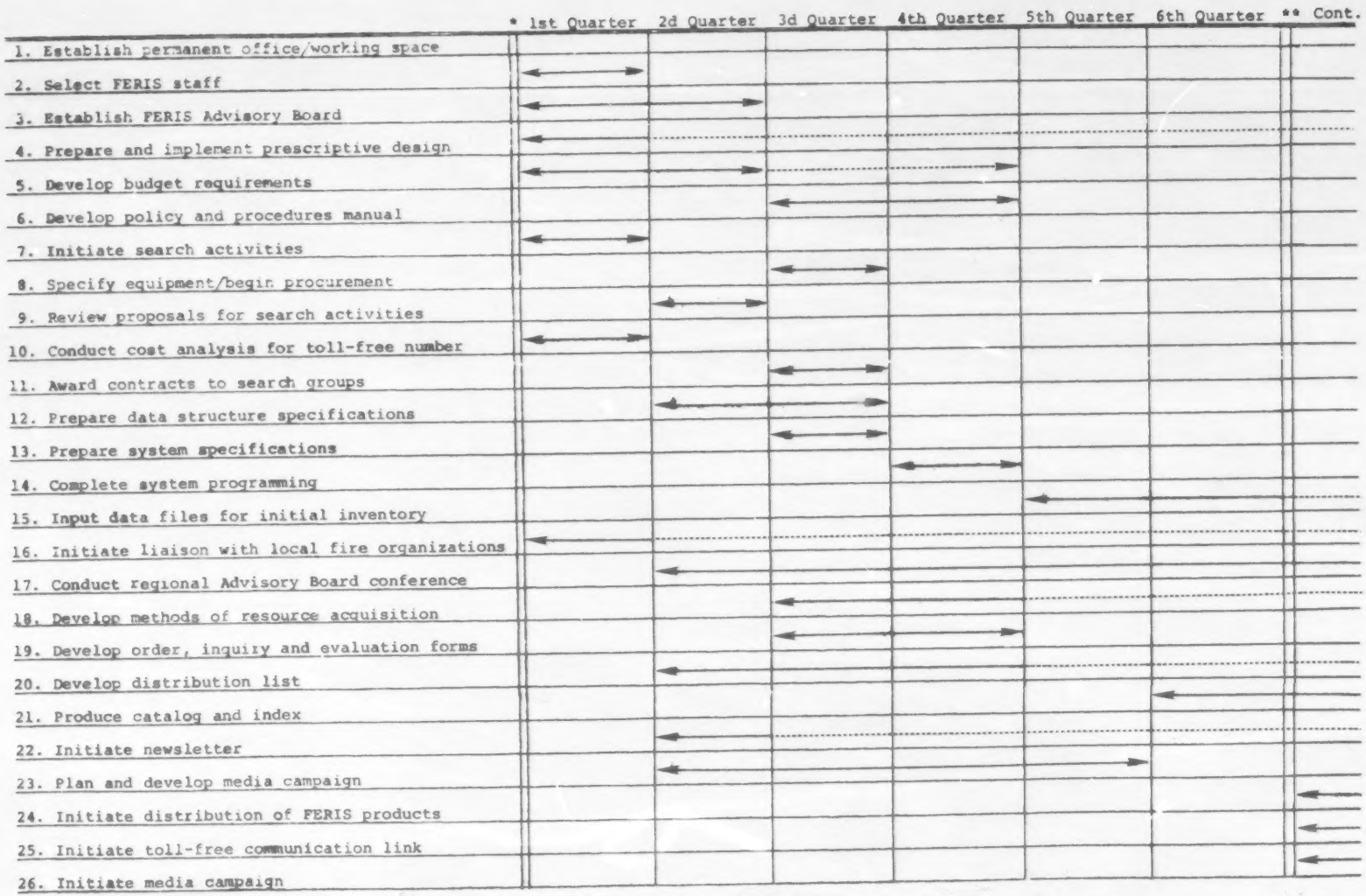
Communication ("800" line) = $25,000

File maintenance (500 new entries annually) = $11,000 to $15,000

Publication = $10,000 to $15,000

Estimated annual operating costs GRAND TOTAL = Between $160,000 to 170,000

Table 2. FERIS TASK PLANNING SCHEDULE


* 1st Quarter
2d Quarter
3d Quarter
4th Quarter
5th Quarter
6th Quarter
** Cont.
1. Establish permanent office/working space
2. Select FERIS staff
3. Establish FERIS Advisory Board
4. Prepare and implement prescriptive design
5. Develop budget requirements
6. Develop policy and procedures manual
7. Initiate search activities
8. Specify equipment/begin procurement
9. Review proposals for search activities
10. Conduct cost analysis for toll-free number
11. Award contracts to search groups
12. Prepare data structure specifications
13. Prepare system specifications
14. Complete system programming
15. Input data files for initial inventory
16. Initiate liaison with local fire organizations
17. Conduct regional Advisory Board conference
18. Develop methods of resource acquisition
19. Develop order, inquiry and evaluation forms
20. Develop distribution list
21. Produce catalog and index
22. Initiate newsletter
23. Plan and develop media campaign
24. Initiate distribution of FERIS products
25. Initiate toll-free communication link
26. Initiate media campaign

*= Start date or effective date of enabling legislation

**= Begin System operation

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U.S. Department of Commerce. Fire Education Planning. Public Education Office, 1977. (34)

U.S. Department of Health, Education and Welfare. Teach Children Fire Will Burn. Washington D.C., 1973. (35)

Weisman, Herman M. Information Systems, Services and Centers. New York: Becker and Hayes, Inc., 1972. (36)

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APPENDIX A

FREQUENCY DISTRIBUTION OF SURVEY RESPONSES

SURVEY RESULTS

Categories of Organizations Surveyed

Category	Number Responding
Education	15
Civic Groups	12
Industry Associations	6
Insurance Companies	3
Fire Service Organizations	33
Total	69

Questions and Responses

1. Do you have any kind of fire safety education program?

   (Probe) yes - 54
   no - 15 (Included 6 fire service organizations, 3 industry associations and the 3 insurance companies)

   1a. Who presents it?

Firemen	33
Teachers	6
Lay member	9
Staff professional	3
Other	3

   1b. Do you ever give programs to other organizations?

   Yes (Free) 27
   Yes (As advertising) 3
   No 15

2. What kinds of materials do you use? (Probe)

   Print 57

Books	33
Other printed materials	24

Audiovisual		87
	Film	27
	Videotape	15
	Slide/tape	21
	Filmstrips	9
	Overheads	6
	Unspecified	9
Other		33
	Demonstrations	18
	Exhibits	12
	Media Advertisements	3

3. What kind of materials would you like to have available?

Format

Video	3
Film	12
Printed Materials	6

Subject

General	6
Training	6
Office Fire Education	3

Other

More current information	9
Adult	1
No Need	6

4. Do you feel there is a good selecti n of fire safety educational materials?

Yes	24
Yes, but needs improvement	3
No	18

5. Where do you get the materials that you use?

Fire Department	15
Books	6
Insurance Underwriters	3
California Department of Forestry	6
Teachers (Community College)	3
NFPCA	3
NFPA	15
IFSTA	6
In-House	12

5b. If produced in-house, would you make it available to to others?

Yes	11
No	1

5c. At what price?

Free	9
Nominal charge	2

6. To what age groups do you present these materials?

Adult	6
K - 12	15
K - 6	6
College age 18-30	6
Adult	30
Civic group	3
Industry	3
Clients	3
Professional Fire Training (in-house)	6
Other	15
School	
K - 6	6
K - 12	15
Community College	3

6a. Are the materials appropriate to the age group?

Yes	39
Could be better tailored to age group	15

7. How often do you use these materials?

a. Weekly basis	24
b. Once a Month	9
c. Once a year	3
d. Irregular basis	9

8. If you had other materials, could you use them more often?

Yes	27
No	18

9. Do you think there is a need for central system for information concerning fire education materials that are available?

Yes	51
Don't Know	12 (included 3 fire service organizations)

10. Do you have a budget or funds for renting or purchasing fire education materials?

Yes	30 (6 Education / 24 Fire service organizations)
No	15
Limited	6

11. Please send a listing of materials you use.

(Only three responses were received / two film titles and a textbook reference.)

12. What types of audiovisual equipment do you have available for use? (probe)

a.	Film projects	39
b.	Video type playback	42
c.	Slide/tape	42
d.	Overhead projectors	39
e.	None	3

APPENDIX B

COMPARATIVE ANALYSIS

OF MACHINE AIDED INDEXES

It was the assigned function of this portion of the study to describe an information receiving format that would be applicable to indexing the resources that are appropriate to FERIS. This seemed to be a relatively simple idea, but continuing research and thought raised more questions than answers. It became obvious that the definition of the format must wait upon the definition of the parameters of FERIS. The same research raised the possibility of shifting the assummed emphasis of FERIS as a fire prevention information system to a total fire information system that could include detection, extinguishment, medical aspects, equipment, recognized experts, and law information among other entries. Implementing FERIS as an index to resources could follow several patterns, listed in order of increasing cost:

1. Strictly as a research service making individual queries. Best and lowest cost service for this type of operation would be via grant to a university with a large library and a good set of indexes.
2. Development of an index of resources peculiar to the state to be included as part of a research service. Via university grant.
3. Development and distribution of a catalog for a research service with limited distribution of printed material and a limited loan service for non-print material. Via grant.
4. Development and distriubtion of a consolidated index of resources based upon computerized extracts

of other indexes. Via contract with present publisher of a successful index, published on microfiche.

5. Development and distribution of a comprehensive index involving the collection of original material. Via a present publisher.

The following pages do not, therefore, present a recommended format for receiving information for FERIS but do provide an exposition and illustration of some of the complexities involved.

It is necessary to compile an index of the available resources before a really effective attempt is made to implement a broad-based system of public fire safety education. The index will force the description of the resources into a standardized format which will enable the system designer to quickly assess the types, quantities and qualities of the currently available resources. The resources may include (but are not limited to) such items as: text books, pamphlets, leaflets, motion pictures, slides, television programs, special equipment, courses, study guides, lesson plans, human resources, etc.

A search of available indexes has not revealed a single instance of the type of broad-base resource indexing required by the FERIS concept.

There are many indexes available that contain some of the information needed by FERIS. A cursory search for information applying to fire safety education might involve the use of a

few of the more obvious indexes, but any researcher who is involved in a really painstaking search must literally examine thousands of volumes (the reference section of the C.S.U. Chico library subscribes to hundreds of indexes). Most of these indexes are concerned either with periodicals or books, some with research papers and some provide information about the availability of the so-called "non-print media."

An examination of some of the available material will illustrate the various descriptions required of an item prior to indexing.

Indexing or cataloging is an extremely complex subject. The subject headings, Library of Congress, (eighth edition, 1975) uses nearly 80 pages to describe the derivation and use of the subject headings. The complexity of publishing even such a "simple" thing as an index of subject headings may be indicated by this quote from the preface:

> "When the seventh edition (1966) of the present work, . . . , was printed by photocomposition from computer-produced tape, it was hoped that a base had been developed into which subsequent supplements could be merged and a new edition published in a relatively short time when needed. Technical shortcomings quickly made it evident that this hope was an oversimplification. Finally it was decided that the only approach to a new edition was that of reformatting the seventh edition and each supplement . . . ."

Fire-making *(Ethnology, GN416-417)*
Fire-marks *(British insurance, HG9799)*
x Fire-plates
Insurance, Fire—Office marks
xx Insurance, Fire
Fire-plates
See Fire-marks
Fire prevention *(Direct) (TH9111-9599)*
sa Building, Fireproof
Electric apparatus and appliances—Fires and fire prevention
Fire extinction
Fireproofing
Forest fires—Prevention and control
Grassland fires—Prevention and control
Insurance engineering
Lightning-arresters
Lightning-conductors
Lightning protection
Mine fires—Prevention and control
Radio in fire prevention
subdivision Fires and fire prevention *under names of cities, e.g.* London—Fires and fire prevention; *and under various classes of institutions and buildings, e.g.* Factories—Fires and fire prevention; Theaters—Fires and fire prevention
x Prevention of fires
xx Fires
Fire sprinklers *(TH9538)*
x Automatic sprinklers
Sprinkling systems
xx Fire extinction
Sprinklers
Fire streams *(TH9323)*
xx Fire extinction
Nozzles
Fire-testing *(TH1091-1098)*
xx Building, Fireproof
Building materials—Testing
Fire prevention—Research
Fireproofing
Testing
Fire-worshipers *(BL453; Zoroastrianism, BL1590 F5)*
sa Fire (in religion, folk-lore, etc.)
Parsees
Zoroastrianism
xx Fire (in religion, folk-lore, etc.)
Parsees
Religion, Primitive
Religions
Worship
Firearms *(Manufacture, TS535-7; Military science, U; Naval science, V)*
Covers works on weapons from which a missile, as a bullet, ball, or shell, is hurled by the action of explosives.
x Percussion-lock
— Maintenance and repair *(TS535)*
xx Gunsmithing
— Patents *(TS535)*
— Private collections *(Direct)*
— Sights *(TS535; Artillery, UF854; Military rifles, UD390)*
sa Telescopic sights
x Sights for firearms
xx Ordnance
Telescopic sights
— Taxation *(Direct)*
x Pistols—Taxation
Revolvers—Taxation
— Testing
Firearms, American, [British, etc.] *(Direct)*
x American [British, etc.] firearms
Firearms control
See Firearms—Laws and regulations
Firearms industry and trade *(Direct) (HD9743)*
Here are entered works on the small-arm industry. Works on heavy firearms ar entered under the heading Ordnance
sa Gunsmithing
xx Armaments
Munitions
— Licenses *(Direct)*

Figure 3. A Typical Library of Congress Subject Heading

Books in Print, 1977-1978, R.R. Bowker Company

is produced using Bowker's Bibliographic Information Publication (BIPS). The data base was begun in 1948, computerized in the late sixties and greatly expanded in the early seventies. This edition lists approximately 478,000 titles from 6000 publishers but excludes the following, although they may be included in other Bowker indexes:

Free books
Books priced at less than 25 cents
Unbound material
Pamphlets
Periodicals
Serials
Government Publications
Puzzles
Maps
Michoforms
Audio-visual material

The bibliographic entries contain the following 25 items or fields of information when available and applicable:

Author
Co-author
Editor
Co-editor
Translator
Title
Original title
Number of Volumes
Volume Number
Edition
Whether or not reprinted
Library of Congress number (not the Subject Heading Number)
Subject information
Series Information
Language if other than English
Whether or not illustrated
Grade range
Date of publication
Type of binding if other than cloth over boards
ISBN (International Standard Book Number)
Imprint
Publisher
Distributor
Notation if new to the data base

BOOKS IN PRINT

FIREARMS - JUVENILE LITERATURE

Tamarin, Alfred. Fire Fighting in America. (Illus.). (gr. 4-6). 1971. 4.95 (78882). Macmillan.
Wilson, Dorothy. Fire Prevention. (Illus.). (gr. 7 up). 1965. PLB 2.95 (ISBN 0-531-01667-6). Watts.
FIRE PROOFING
see Fireproofing
FIRE PREVENTION - RESEARCH
Committee On Fire Research. Directory of Fire Research in the United States, 1965-1967. 4thed ed. 1968. pap. 7.00. Natl Acad Sci.
Committee On Fire Research- National Research Council. Directory of Fire Research in the United States, 1967-1969. 1970. pap. text ed. 13.50 (ISBN 0-309-01763-7). Natl Acad Sci.
International Symposium On The Use Of Models In Fire Research - 1959. Proceedings. 1959. 5.00. Natl Acad Sci.
FIRE PUMPS
see Pumping Machinery
FIRE RESEARCH
see Fire Prevention - Research
FIRE-WORSHIPPERS
see also Fire (In Religion, Folk Lore, Etc.)
Zoroastrianism
FIREARMS
Howe, Walter J. Professional Gunsmithing. (Illus.). 1946. 10.00 (ISBN 0-8117-1375-X). Stackpole.
Huntington, R. T. Hall's Breechloaders. 1971. 15.00 (ISBN 0-87387-025-5). Shumway.
Jacquinet, C., illus. Master French Gunsmiths' Designs of the Mid-Seventeenth Century. facsimile ed. (Illus.). 1950. 15.00 (ISBN 0-87387-009-3). Shumway.
Journal of the Historical Firearms Society of South Africa, Vol. 1. (Illus.). 1964. Repr. of 1958 ed. 6.32. Verry.
Kennedy, Monty. Checkering & Carving of Gunstocks. rev. ed. 1962. 10.00 (ISBN 0-8117-0630-3). Stackpole.
Kollier, Larry. Golden Guide to Guns. rev. ed. (Illus.). (gr. 10 up). 1966. pap. 1.25 (ISBN 0-307-24341-9, Golden Pr). Western Pub.
Kuhlhoff, Pete. Kuhlhoff on Guns. (Illus.). 1970. 5.95 (ISBN 0-87691-009-6). Winchester Pr.
Lavin, James D. History of Spanish Firearms. (Illus.). 1965. 9.95 (ISBN 0-668-01240-4). Arco.
Lenk, Thorsten. Flintlock: Its Origin & Development. 30.00 (ISBN 0-87556-149-7). Saifer.
Lewis, Berkeley R. Small Arms & Ammunition in the United States Service 1776-1865. (Illus.). 1956. 12.50 (ISBN 0-87474-059-2). Smithsonian.
Leyson, Burr W. More Modern Wonders & How They Work. rev. ed. (Illus.). 1952. 3.95 (ISBN 0-525-15983-
Willett, Roderick. Gun Safety. (Illus.). 1967. 5.25. Intl Pubns Serv.
Wycoff, James. Famous Guns That Won the West (Photos). 1968. Repr. of 1966 ed. lib. bdg. 4.50 (668-01725-2). Arco.
FIREARMS - CATALOGS
Chapel, Charles E. Gun Collector's Handbook of Values. rev. ed. (Illus.). 1970. 12.50. Coward.
Keith, Elmer. Guns & Ammo 1972 Annual. Guns And Ammo Magazine Editors, ed. 1971. pap. 3.95. Petersen Pub.
West, Bill. J. Stevens Arms Catalogues, 1875-1899. 1st ed. (West Arms Catalogues Ser). (Illus.). 1971. 10.00 (ISBN 0-911614-11-7). B West.
- - Remington Arms Catalogues, 1877-1899. 1st ed. (West Arms Catalogues Ser). (Illus.). 1971. 10.00 (ISBN 0-911614-09-5). B West.
- - - Remington Arms Catalogues: 1877-1899. 1st ed. (Illus., Orig.). 1970. 10.00 (ISBN 0-911614-09-5). B West.
FIREARMS - COLLECTORS AND COLLECTING
Akehurst, Richard. Antique Weapons for Pleasure & Investment. (Illus.). 1970. 5.95 (ISBN 0-668-02277-9). Arco.
Chapel, Charles E. Complete Book of Gun Collecting.

Figure 4. An Example of a "Books in Print" Entry

The Educational Resources Information Center (ERIC) index is the compilation of the efforts of several associated clearing houses which are devoted to indexing documents, as opposed to books or serials. Usage is keyed to an arbitrary accession number or document number.

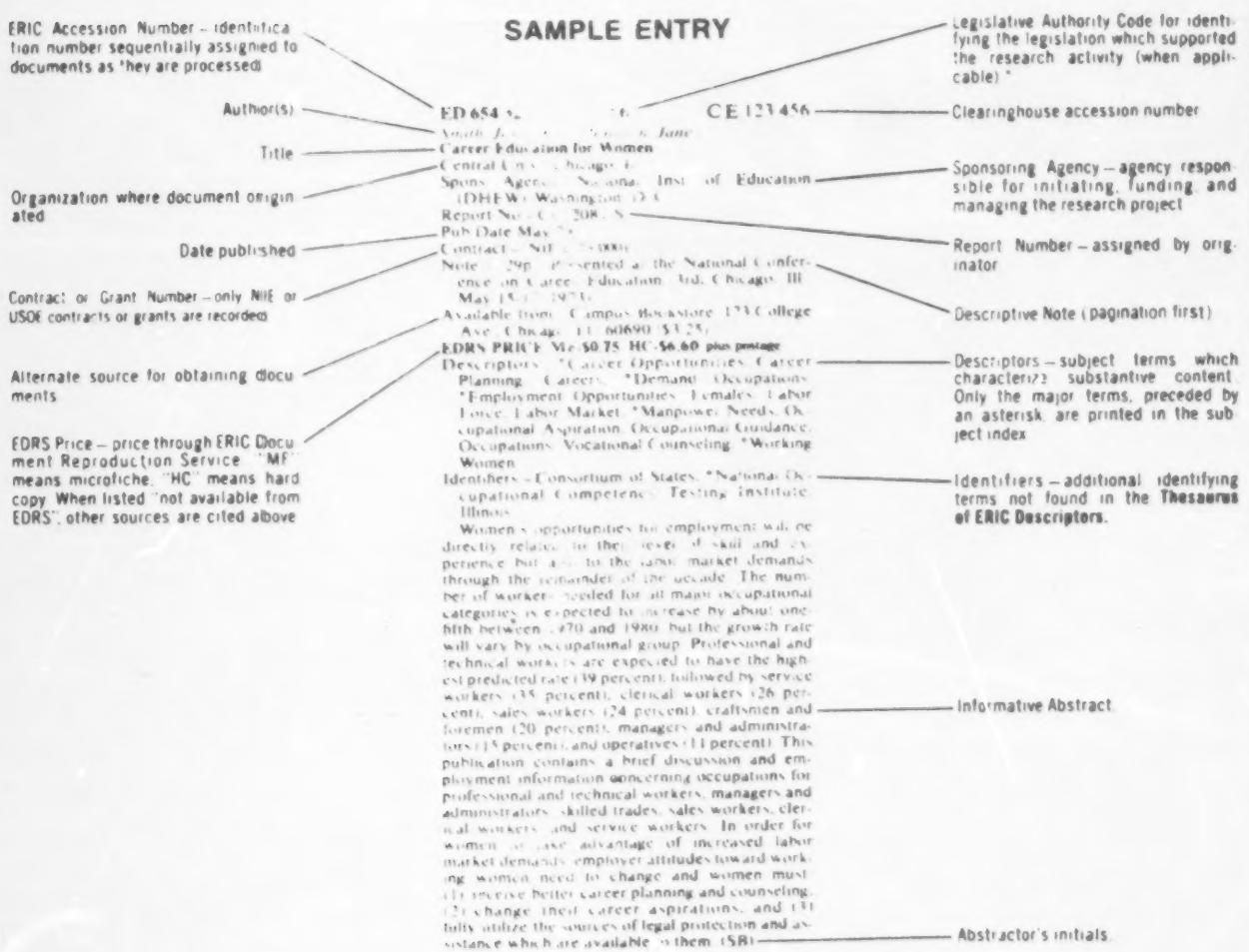

SAMPLE ENTRY
ERIC Accession Number – identification number sequentially assigned to documents as they are processed
Author(s)
Title
Organization where document originated
Date published
Contract or Grant Number – only NIE or USOE contracts or grants are recorded
Alternate source for obtaining documents
EDRS Price – price through ERIC Document Reproduction Service. "MF" means microfiche. "HC" means hard copy. When listed "not available from EDRS", other sources are cited above
ED 654 ...
CE 123 456
Career Education for Women
Central ... Chicago, Ill.
Spons Agency ... National Inst. of Education (DHEW) Washington, D.C.
Report No: ... 208 ... S
Pub Date May ...
Contract ... NIE ...
Note ... 29p.; ... presented at the National Conference on Career Education, Ord, Chicago, Ill. May 15 ... 1973)
Available from: Campus Bookstore, 133 College Ave., Chicago, Ill. 60690 ($3.25)
EDRS PRICE MF-$0.75 HC-$6.60 plus postage
Descriptors: *Career Opportunities; Career Planning; Careers; *Demand Occupations; *Employment Opportunities; Females; Labor Force; Labor Market; *Manpower Needs; Occupational Aspiration; Occupational Guidance; Occupations; Vocational Counseling; *Working Women
Identifiers – Consortium of States; *National Occupational Competence Testing Institute; Illinois
Women's opportunities for employment will be directly related to their level of skill and experience but also to the labor market demands through the remainder of the decade. The number of workers needed for all major occupational categories is expected to increase by about one-fifth between 1970 and 1980, but the growth rate will vary by occupational group. Professional and technical workers are expected to have the highest predicted rate (39 percent), followed by service workers (35 percent), clerical workers (26 percent), sales workers (24 percent), craftsmen and foremen (20 percent), managers and administrators (15 percent), and operatives (11 percent). This publication contains a brief discussion and employment information concerning occupations for professional and technical workers, managers and administrators, skilled trades, sales workers, clerical workers, and service workers. In order for women to take advantage of increased labor market demands, employer attitudes toward working women need to change and women must (1) receive better career planning and counseling, (2) change their career aspirations, and (3) fully utilize the sources of legal protection and assistance which are available to them. (SB)
Legislative Authority Code for identifying the legislation which supported the research activity (when applicable)
Clearinghouse accession number
Sponsoring Agency – agency responsible for initiating, funding, and managing the research project
Report Number – assigned by originator
Descriptive Note (pagination first)
Descriptors – subject terms which characterize substantive content. Only the major terms, preceded by an asterisk, are printed in the subject index
Identifiers – additional identifying terms not found in the Thesaurus of ERIC Descriptors.
Informative Abstract
Abstractor's initials

Figure 5. Sample of ERIC Document Entry

There are 7 sections of interest to this study:

1. A thesarus of descriptors (approved subject headings with cross references to related heading).
2. A descriptor to document number index.
3. An author index (author, title, & document number).
4. An institution index (publisher, title & document number).
5. A subject index (descriptor, title & document number).
6. A cross reference index (individual clearing house accession numbers to ERIC document numbers).
7. Document resumes (document numbers, author, title, institution, publication date, notes, copy price, descriptors, identifiers, resume).

The Current Index to Journals in Education (CIJE) is also published by the ERIC group and the organization of CIJE is compatible with the ERIC index.

EXAMPLE

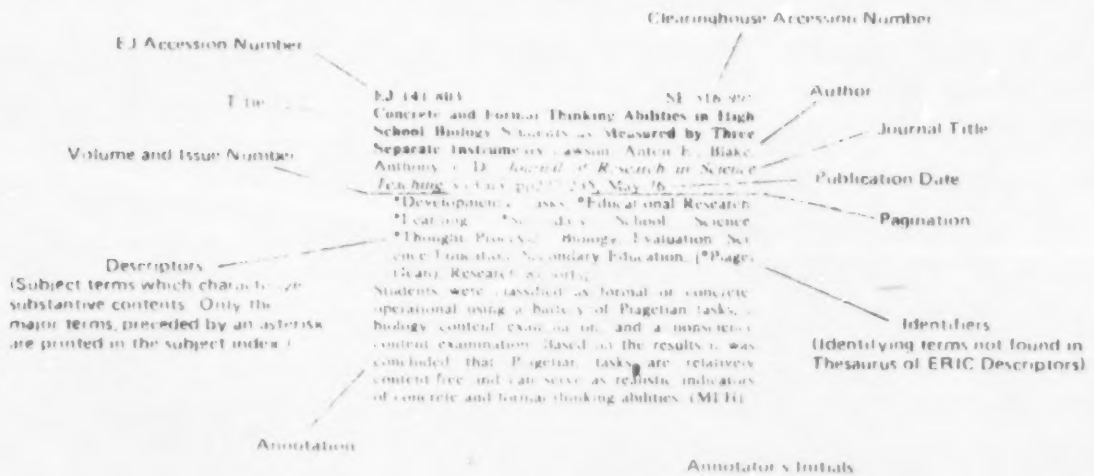


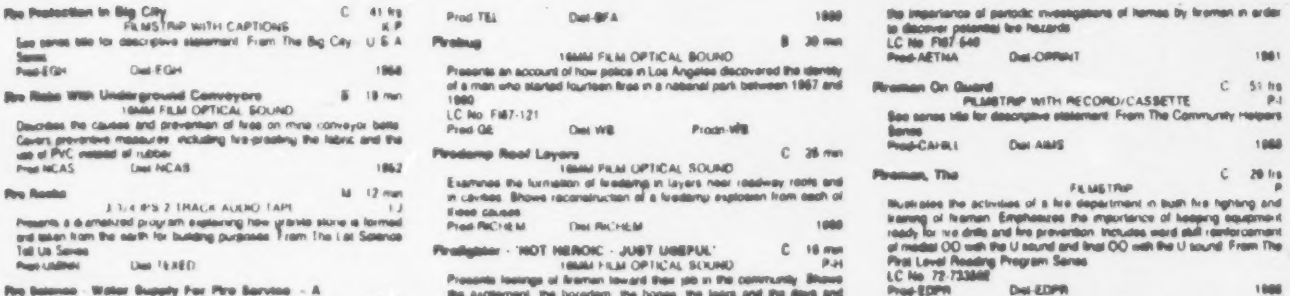
Figure 6. The CIJE Entries

The National Information Center for Educational Media (NICEM) publishes the largest index of educational non-print material that is available. The index, of over 350,000 entries, is published in several volumes:

16mm films (100,000 entries)
35mm films (70,000
Overhead transparencies (60,000)
Audio tapes (28,000)
Phonograph records (25,000)
8mm film cartridges (26,000)
Slides (28,000)
Producers and distributors (16,000)

And also in five multimedia volumes:

Free educational materials (10,000)
Psychology (28,000)
Vocational and technical education (32,000)
Health and safety education (33,000)
Environmental studies (26,000)



Fire Protection In Big City C 41 frs
FILMSTRIP WITH CAPTIONS K-P
See series title for descriptive statement. From The Big City Series
Prod-EGH Dist-EGH 1968

Fire Risks With Underground Conveyors B 18 min
16MM FILM OPTICAL SOUND
Discusses the causes and prevention of fires on mine conveyor belts. Covers preventive measures including fire-proofing the fabric and the use of PVC instead of rubber.
Prod-NCAS Dist-NCAS 1962

Fire Rocks M 12 min
3 3/4 IPS 2 TRACK AUDIO TAPE I-J
Presents a dramatized program explaining how granite stone is formed and taken from the earth for building purposes. From The Let Science Tell Us Series
Prod-UMRH Dist-HUBED

Fire Science - Water Supply For Fire Service - A Series H-C A
Presents fire science instruction on water supply for fire service
LC No. 74-733404
Prod-LAHSFD Dist-LAHSFD 1974

Prod-TEL Dist-BFA 1968

Firebug B 30 min
16MM FILM OPTICAL SOUND
Presents an account of how police in Los Angeles discovered the identity of a man who started fourteen fires in a national park between 1967 and 1969.
LC No. FI67-121
Prod-GE Dist-WB Prodn-WB

Fireclamp Roof Layers C 25 min
16MM FILM OPTICAL SOUND
Examines the formation of fireclamp in layers near roadway roots and in cavities. Shows reconstruction of a fireclamp explosion from each of three causes.
Prod-RICHELM Dist-RICHELM 1969

Firefighter - 'HOT HEROIC - JUST USEFUL' C 16 mm
16MM FILM OPTICAL SOUND P-H
Presents feelings of firemen toward their job in the community. Shows the excitement, the boredom, the hopes, the fears and the days and nights of actual firemen in real situations that seem not just pressie but also poetic.
LC No. 72-703001
Prod-ASPTEF Dist-ASPTEF 1971

the importance of periodic investigations of homes by firemen in order to discover potential fire hazards.
LC No. FI67-648
Prod-AETNA Dist-CPRINT 1961

Fireman On Guard C 51 frs
FILMSTRIP WITH RECORD/CASSETTE P-I
See series title for descriptive statement. From The Community Helpers Series
Prod-CAHILL Dist-AIMS 1968

Fireman, The C 29 frs
FILMSTRIP P
Illustrates the activities of a fire department in both fire fighting and training of firemen. Emphasizes the importance of keeping equipment ready for live drills and fire prevention. Includes word skill reinforcement of medial OO with the U sound and final OO with the U sound. From The First Level Reading Program Series
LC No. 72-733846
Prod-EDPR Dist-EDPR 1968

Fireman, The C 31 frs
FILMSTRIP WITH CAPTIONS P
See series title for descriptive statement. From The Our Neighborhood Helpers Series

Figure 7. Some Entries from a NICEM Multimedia Index

New item input to the NICEM data bank is via a series of specialized forms (with up to 28 descriptive item sections) That are supplied to the Library of Congress by the producers and/or distributors of new releases. Details about the NICEM indexes are contained in Inclosure 1.

The learning directory of Westinghouse Learning Corporation (Inclosure 2) had an especially easy to use format. Its system of redundant entries (200,000 distinct items of instructional material indexed as 600,000 entries under more than 225,000 topics) provided quick identification of materials with minimal cross checking of topics. This index used forty-seven media classifications including books, pamphlets, models, computer assisted instruction, etc.

Fire Prevention		Book	True Story of Smokey the Bear, The	-	-	1 se	69	3.19	Western Publishing	69019	
Fire Prevention	P	Filmstrip	I'm No Fool with Fire (S)	C	-	c50 fr	P69	6.00	Encyclopaedia Brit	69027	
Fire Prevention		Movie 16mm Reel	Fire	B	O	1 re	P69	60.00 *	Gateway Productions	69M9	
Fire Prevention		Transparency*	October (Ser 27)	-	-	1 se	P70	.55 –	Jenn Publications	70E29	
Fire Prevention	P	Workbook*	Thanksgiving, October, Birds	-	-	96 pp	P70	40 +	Jenn Publications	70E22	
Fire Prevention	P-I	Filmstrip	Fire Prevention at Home and in School (S)	C	-	--	P70	5.00	Eye Gate House	70A68	
Fire Prevention	P-I	Movie 16mm Reel	I'm No Fool with a Fire	C	O	8 mi	P69	110.00 *	Walt Disney	69A7	
Fire Prevention	P-I	Movie 16mm Reel	Safety with Fire	C	O	11 mi	P69	LOAN	Conn St Dept Health	69A64	
Fire Prevention	P-I	Movie 16mm Reel	Safety with Fire	E	O	11 mi	P70	130.00 –	Coronet Films	70A28	
Fire Prevention	P-I	Movie 16mm Reel	Your Friend the Forest (Save It or Destroy It)	C	O	6 mi	P69	65.00 –	Encyclopaedia Brit	69A60	
Fire Prevention	P H	Movie 16mm Reel	In Case of Fire (Fire Drills and Fire Safety)	C	O	20 mi	P69	265.00 –	Encyclopaedia Brit	69A59	
Fire Prevention	P	Printed Matter	National Standard Student Residence Fire Check List	-	-	25 se	P70	1.15	Natl Safety Council	70A42	

Figure 8. Example from the Westinghouse Learning Directory

The economies of scale are of some help in holding costs down when building large scale data systems such as the ERIC or NICEM data bases, but the fact remains that data collection is an extremely expensive business and the per/entry cost of making a completely original collection of data for the FERIS system may well be so high that the system may either not be funded or, even worse, may not receive sufficient funds to do the job properly. A few observations that apply to doing the job properly are:

1. The better systems require a minimum of 25 items or fields to describe a single entity or entry into the system. A system could be developed that would not need so many fields but such an abbreviated system would lose much of its flexibility and adaptability to a computerized search (or indexing operation).
2. "Excess" descriptive items for an entry in a data base do not have to be recovered or used when constructing an index. The cost of collecting and entering such excessive items would be only a small percentage of the basic cost.
3. The cost of collecting and appending additional descriptive fields to an existing entry in a data base will exceed the costs of the original entry.

4. The description of any entity or entry within the FERIS system must follow the same general format. NICEM succeeds with such divergent entries as overhead projector transparencies and television tapes. The Westinghouse system did even better and there is no reason that other appropriate entries (such as the appropriate skills of available humans and/or the latest educational or firefighting equipment cannot also be described within the same style of formatting.
5. Any attempt to implement FERIS as per pattern 4 or 5 must be carefully cordinated with national authorities on indexing in order to provide for the collection and promulgation of a data base that may be easily reformatted as circumstances dictate, thus avoiding the Library of Congress's problem.
6. Any published index for FERIS, either printed or micro-fiche, should require the very minimum of cross-searching to locate the information that the user needs. Some of the indexes are so specially organized that the assistance of a research librarian is almost a necessity. The Westinghouse format is probably the best framework to build around; especially if it were also coupled to a separate resume section coded to an accession number.

Inclosure 1

nicem Newsletter
National Information Center for Educational Media FALL, 1976

NICEM Announces Subscription to the Most Comprehensive Non Print Media Indexes Ever Published.

Currently 20 volumes covering eight media, an Index to Producers and Distributors and four updates with a total of over one-half million entries is now being published for distribution.

These volumes represent all new editions of the Indexes including two new titles which are the *Index to Free Educational Materials–Multimedia* and the *Index to Environmental Studies–Multimedia*.

The basic information package includes the latest subscription editions of the nine basic NICEM indexes, available in either bookcopy or microfiche format, plus four updates to the set. The nine indexes are:

- The Index to 16mm Educational Films (4 vol), 6th edition
- The Index to 35mm Educational Filmstrips (3 vol), 6th edition
- The Index to Educational Overhead Transparencies (2 vol), 5th edition
- The Index to Educational Audio Tapes, 4th edition
- The Index to Educational Video Tapes, 4th edition
- The Index to Educational Records, 4th edition
- The Index to Educational Slides, 3rd edition
- The Index to 8mm Motion Cartridges, 5th edition
- The Index to Producers and Distributors, 4th edition

The subscription to either the bookcopy "Option One" or the microfiche "Option One" plan will represent a savings of more than 15% from the cost of the individually purchased indexes.

In addition to the subscription "Option One" plan, each of the nine single media indexes may be purchased separately. The customer who purchases five or more single media indexes will be eligible to receive the updates free of charge.

NICEM will continue to publish its multimedia series introducing two new titles. The series now consists of:

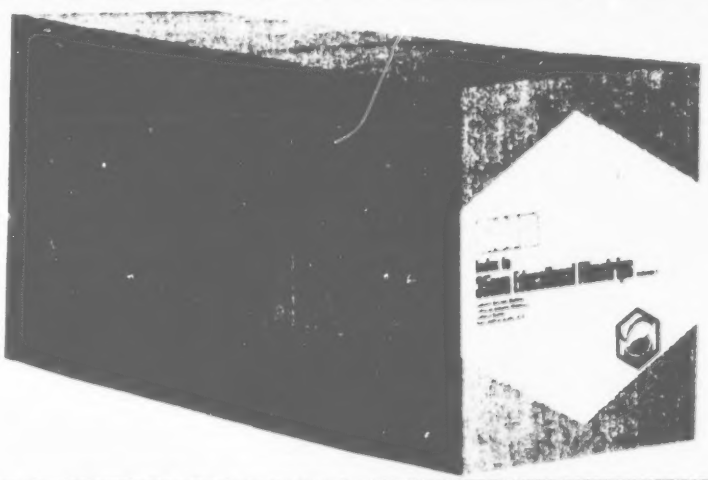
- The Index to Psychology–Multimedia, 3rd edition
- The Index to Vocational and Technical Education–Multimedia, 3rd edition
- The Index to Health and Safety Education–Multimedia, 3rd edition
- The Index to Environmental Studies–Multimedia, 1st edition
- The Index to Free Educational Materials–Multimedia, 1st edition

The new editions contain up-to-date information. NICEM has also improved the type face used in the indexes, for easier scanning and reference work. The increase in the number of subject headings makes the subject heading reference outline more specific and, therefore, more meaningful to the user.

As indicated above, NICEM publishes essentially two formats from the data base, either in book copy or microfiche. One format is indexed by media type, such as filmstrips, slides, audio tapes, etc. i.e. *Index to 35mm Educational Filmstrips*. The other format provides a mixture of these media or what is often referred to as a multimedia index. i.e., the *Index to Psychology–Multimedia*. Common to all the NICEM Indexes, whether by individual media or multimedia, are the five sections of information which are interrelated for the purpose of manual searching. These are: 1) Subject Heading Outline; 2) Index to Subject Headings; 3) Subject Guide; 4) Alphabetical Guide; and 5) the Producer/Distributor Code Section alphabetically by code and by name (see inset).

The first step in using the different Indexes is to carefully read the Introduction which generally discusses the layout and the types of information to be found with interpretive keys.

1. The *Subject Heading Outline* lists the major categories and the subheadings providing those key words or headings under which titles are cataloged. This outline provides a quick scanning for those users searching by subject-oriented objectives.



2. A further subject heading breakdown is found in the *Index to Subject Headings* which provides key word access to the NICEM subject headings allowing the user additional search capabilities. For example, the *Index to Subject Headings* lists the key word *Audiovisual* in heavy bold type, followed by the major heading *Education* in small bold type, followed by the sub-heading *Educational Technology*. The NICEM data banks carry the major heading *Education* and the sub-heading *Educational Technology* under which the searcher would find titles related to *Audiovisual*.
3. The Third section of the Index is the *Subject Guide* where the actual titles are listed by major subject category and sub-heading. In addition to the complete title, the grade or audience level designation is given (if available) which is interpreted as follows:

K Pre-school to kindergarten
P Primary
I Intermediate (4-6)
J Junior High School (7-9)
C Junior College, College, and University
T Teacher Education (Designed for training teachers)
A Adult education and general use
S Special Education (Designed for special audiences, such as physically handicapped, mentally retarded, and gifted)
R Religious (Designed to project a religious message, moral or philosophy)
PRO Professional Use (Designed for such groups as medicine, dentistry, and law)
IND Industrial Use (Designed for use in industrial training)

In addition to the complete title and audience level, the distributor code is provided which further allows the user to identify the source of the title.

4. The most enumerative section of the Indexes is the *Alphabetical Guide* where up to twenty information elements can be provided for each entry with additional subsets of information provided in areas of series listings and physical description.

Elements of information provided in the Alphabetical Guide are as follows:

1. Title with subtitle
2. Size and physical description (see explanation below)
3. Length
4. Stock or color code.
   a. C–Color
   b. B–Black and White
   c. X–Both
   d. M–Monaural
   e. S–Stereo
5. Description of the contents
6. Series title reference when applicable
7. Audience or grade level
8. Producer and Distributor code (Also, some production credit codes given)
9. Year of release in the U.S.
10. Library of Congress catalog card number (when available)
11. Broadcast quality (applicable to Video Tapes)

Series title entries including the following information:

1. Title
2. Version or edition
3. Year of release in the U.S.
4. Description of the series content
5. Producer, Distributor and Production Credit Codes
6. Grade or Audience Level
7. Names of individual titles in series with length for each title
8. Library of Congress catalog number (when available)
9. Individual titles within the series contain the following information:
   a. Running time (16mm films [MP], 8mm Motion Cartridges [MC] Video Tapes [MV], Audio Tapes [RT]) followed by the Media Code.
   b. Number of frames (35mm Filmstrips [FS], Slides [TS],) followed by the Media Code.
   c. Number of overlays (Overhead Transparencies [TR]) followed by the Media Code.
   d. Number of sides (Records [RD]) followed by the Media Code. Some entries indicate the bands on each record.

Whether the user is searching by subject area or title the *Alphabetical Guide* provides the necessary information for the user to make his first level of selection prior to the preview and evaluation stage of determining those media to be used in instructional planning to achieve learning objectives.

5. The fifth section of the Indexes constitute the basis for locating the actual media, which is the *Producer/Distributor Code Section* which has actually two subsections one is alphabetical by code, the other alphabetical by name. The *Alpha by Code Section* lists the codes of producers and distributors to be found with each entry in the *Alphabetical Guide* as well as those distributor codes listed with each title in the *Subject Guide*. The section provides the complete name and addresses for most producers and distributors which are still active. Some codes carry the company name only, indicating a company or agency no longer functional. For those nonfunctional entities, distribution of titles are often assumed by other companies which would be indicated in this section.

The *Alpha by Name Section* provides the user the capability of determining the code if the name of the producer or distributor is known or allows the user the random search capability of determining which companies are involved in educational media production and/or distribution.

Flow and Integrity of Information

Several advantages accrue to the computerized data banks which exist in considerable quantity, as well as to the user of these data banks. First, the logical order and precise manner required for encoding information tends to highlight inconsistencies found in the information. Secondly, computer systems allow not only quick identity of these inconsistencies but also the ability to correct the data banks punctually and on a mass scale.

However, before these stated advantages of computer systems as related to information handling can be used, a logical and valid system of information acquistion must be implemented. In any acquisition systems of information there must be a concise relationship of elements which can be identified as in the NICEM system as follows:

Sources

1. Library of Congress
2. Producers and distributors of nonprint materials
3. Media Centers and Libraries

The Integrity of the file is main-

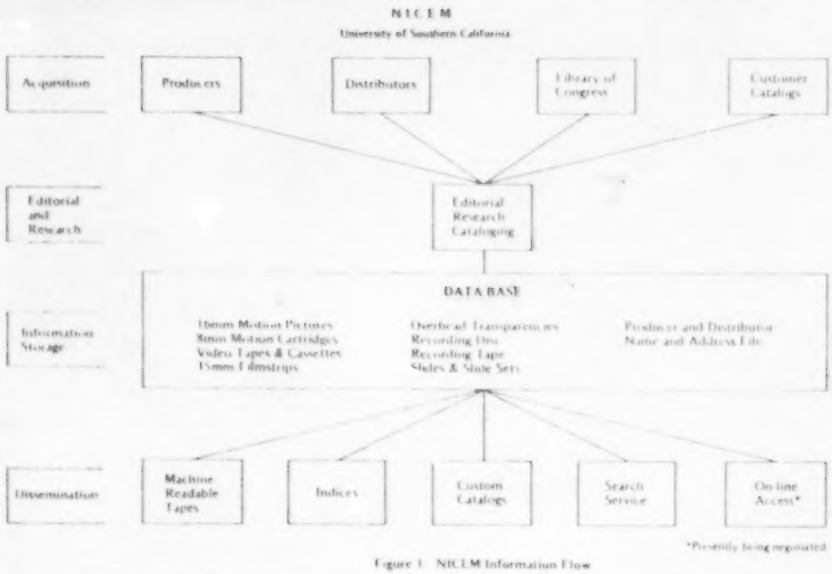


Figure 1 - NICEM Information Flow

tained through checking information from the producer/distributor and the Library of Congress. Likewise, the Research and Editorial Divsion of NICEM maintains extensive archival files of all documents dealing with nonbook educational material for verification of title entries to the data base which are considered incomplete, or containing inaccurate information.

Guides to the formatting and arrangement of information on the data base are the (1) *Standards for Cataloging Nonprint Materials,* published by the Assocation for Education Communications and Technology, and the (2) *Anglo-American Cataloging Rules,* published by the American Library Association.

Input - Library of Congress (see figure 1)

The Library of Congress entered into an agreement with the University of Southern California under which data supplied to the Library on a "Master Input Report Form" will be used jointly by the Library for the production of library cards and by NICEM for compiling the computerized data banks for nonbook educational materials.

Producers and/or distributors of nonbook educational materials submit their new releases to the Library of Congress on these "Master Input Report Forms" which is necessary for the proper cataloging of their titles and the encoding of the information onto the NICEM data banks and into the appropriate NICEM index or updated supplement.

INPUT - Producer/Distributor Input

The NICEM data banks contain over 13,000 names and addresses of all producers and/or distributors who have nonbook educational materials listed on the NICEM file.

On an irregular basis, NICEM retrieves from its data banks all information on each title by producer and/or disbributor which is then forwarded to the company or individual on a computer printout. Each producer/distributor is asked to make any corrections, deletions, or additions to his titles on the printout. Once this has been completed, it is returned to NICEM for updating.

This second means of input provides NICEM the capability of cross-checking accuracy of information from other sources and likewise allowing the producers/distributors to periodically examine their bibiliographic information contained on the data base.

INPUT - Media Centers and Libraries

In providing custom book cataloging on nonbook educational materials for a media center of library, it is necessary for NICEM to identify their holdings. In order to do this, an alphabetical title listing is forwarded to the media center which locates its titles and enters unique information such as call number, audience level and rental rate by the title on the line printer list. Once the titles have been located on this listing by the media center, then input cards are completed for any titles not found on the alphabetical computer printout. This additional input provided by customer catalog customers often provides information on titles which are locally or regionally produced. These titles are entered on the data bank as unverified entries until the proper research is completed to assure accuracy of information.

Once the data base is properly formatted and provides reasonable accuracy of information then the communicative aspects of *output* can be left to the imagination. Currently NICEM provides output as follows (see figure):

1. Machine Readable Tape.
2. Indicies (bookcopy and microfiche)
3. Custom Catalogs
4. Search Service
5. On Line Access*

Using the Multimedia Free Educational Materials Index

NICEM has just completed the compilation of a computerized data bank of free non-print educational materials and is in the process of publishing the 1st edition of the *Index to Free Educational Materials - Multimedia.*

The Index will provide the user access to over 20,000 titles on eight basic media 16mm films, 35mm filmstrips, 8mm motion cartridges, video tapes, overhead transparencies, records, audio tapes and slides comprising four sections within the Index. These four sections are the "Subject Heading Outline" which lists all the major and sub-headings to be found in the Index; the "Subject Guide" which lists all the titles to be found in the Index filed under the appropriate major and sub-headings, with each title filed on the average of three times and many appearing under as many as nine subject headings - each title appears with a media code indication; the third section is the "Alphabetical Guide" where each title is listed in alphabetical order regardless of the

For additional information concerning NICEM services write
Director, NICEM, University of Southern California, University Park, Los Angeles, CA 90007 or call (213) 746-6681 or 746-5408

media. Each entry in this section carries the following information:

1. Title with subtitle
2. Physical description
3. Running time or length
4. Stock or color code
5. Description of the contents
6. Series reference when applicable
7. Audience or grade level
8. Producer or Distributor codes
9. Year of release
10. Library of Congress catalog card number (when available)
11. Broadcast quality (applicable to video tapes)

The fourth section of the multimedia Index is the producer-distributor code section which is broken down into parts, one listing the codes alphabetically by code include the producer-distributor's complete name and address; the second part of this section lists the producer-distributors alphabetically by name, with the code following. Codes are also provided for the terms and conditions for ordering materials.

The Index to Free Educational Materials–Multimedia published by

NICEM offers the user one of the most accurate reference sources for intructional planning whether it be in the primary-kindergarten or professional graduate levels of education. For example, under the subject heading "Safety–Fire" you will find all the titles related to this particular heading listed alphabetically under each media. In this case filmstrips are listed first followed by 8mm motion cartridges, 16mm motion pictures, video tapes, records, audio tapes, transparencies and slides.

If a major part of a curriculum planning effort is to teach primary-kindergarten level the concepts of "fire safety" you will find all those media titles directly related to this area and grade level in eight different media. Further information provided in the "Alphabetical Guide," as indicated in the early part of this article, can aid the curriculum or course of study planners make a determination relative to what media is to be obtained, reviewed and evaluated before becoming an integral basis for teaching the fundamentals of fire safety to primary-kindergarten audience level.

This index provides a current solution to the proliferation of free instructional materials which has occurred over the last 30 years in several ways.

1) It presents the titles in a logical sequence filed under multiple subject headings.
2) It provides grade level designations with an annotation which allows the user to make a preliminary evaluation.
3) It provides the necessary information allowing the user to actually locate and secure the titles desired.

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